The PHOTOFACT Servicer

SET 413 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ SEPT 15, 1958

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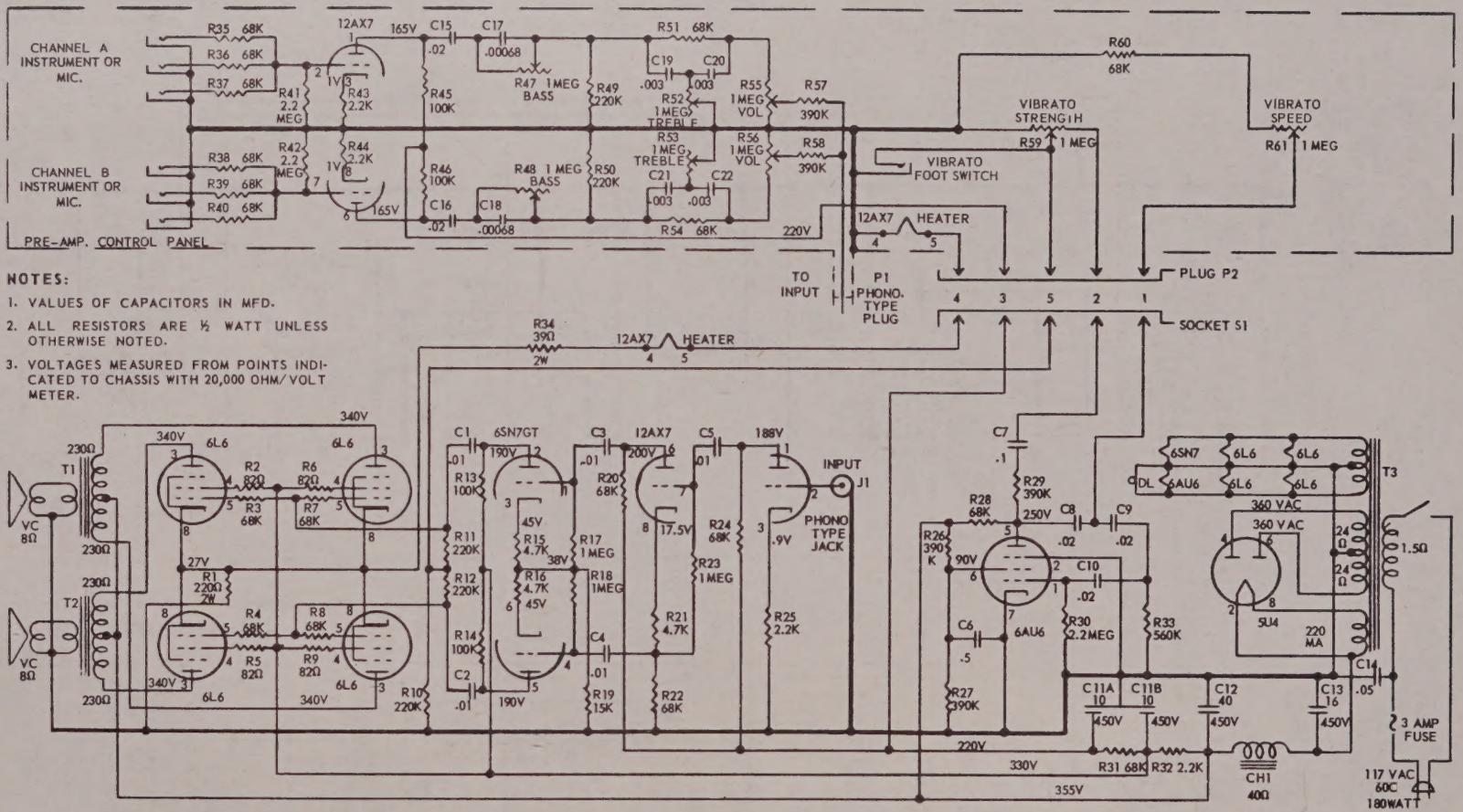
The service information in this Servicer provides data on models which we have been unable to present in PHOTOFACT Folders. The receivers are not in current production; a requirement for PHOTOFACT coverage, and we are therefore presenting schematics and supplementary data that will be of assistance when servicing these models.



NOTES:

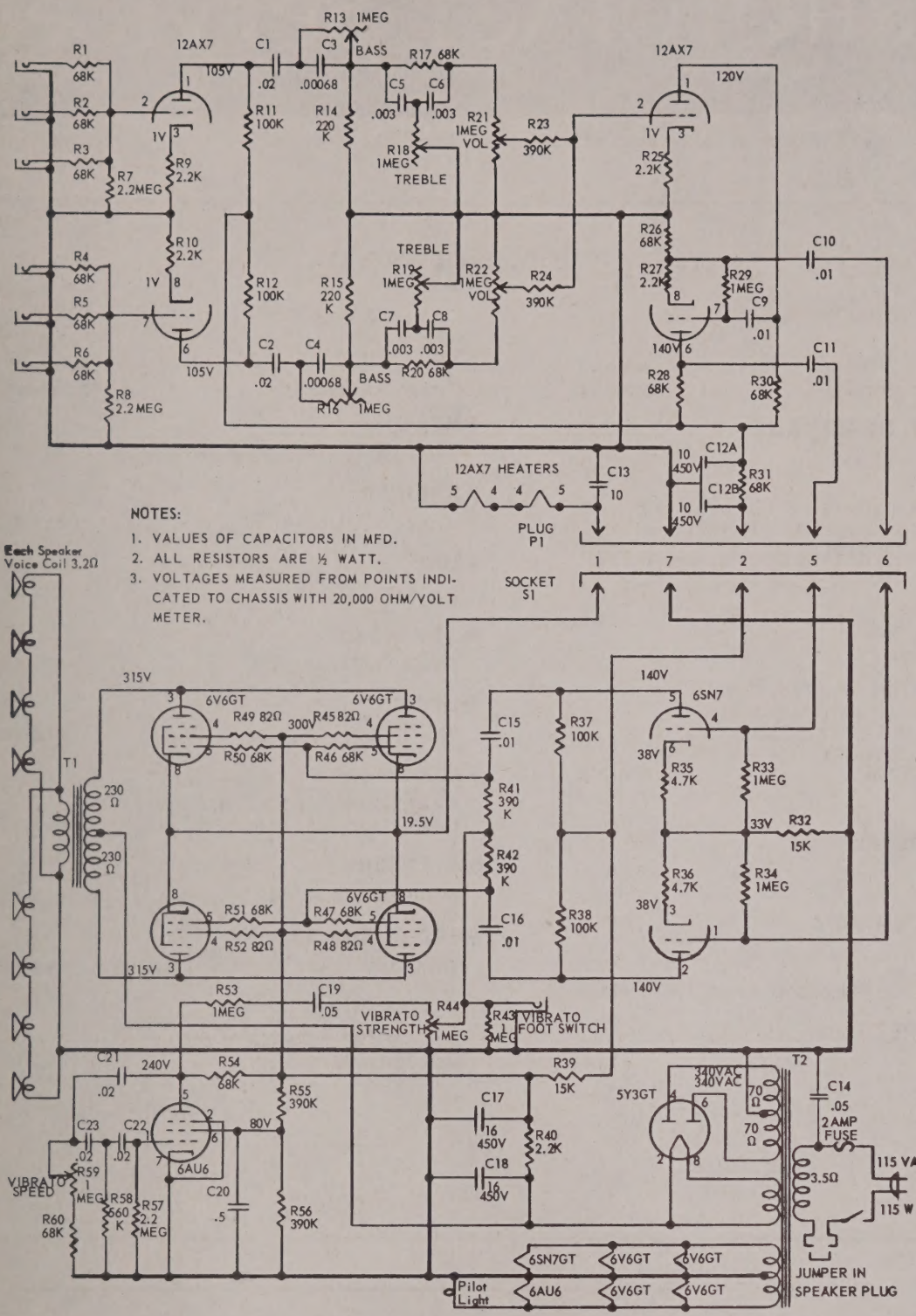
1. VALUES OF CAPACITORS IN MFD.
2. ALL RESISTORS ARE ½ WATT UNLESS OTHERWISE NOTED.
3. VOLTAGES MEASURED FROM POINTS INDICATED TO CHASSIS WITH 20,000 OHM/VOLT METER.

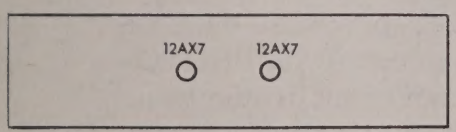
MUCICAL INSTRUMENT AMPLIFIER MODEL GDR-8517A

SCHEMATIC DIAGRAM COURTESY MONTGOMERY WARD & CO.

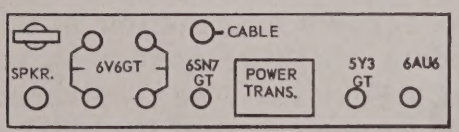
MUSICAL INSTRUMENT AMPLIFIER MODEL GDR-8518A

SCHEMATIC DIAGRAM COURTESY MONTGOMERY WARD & CO.

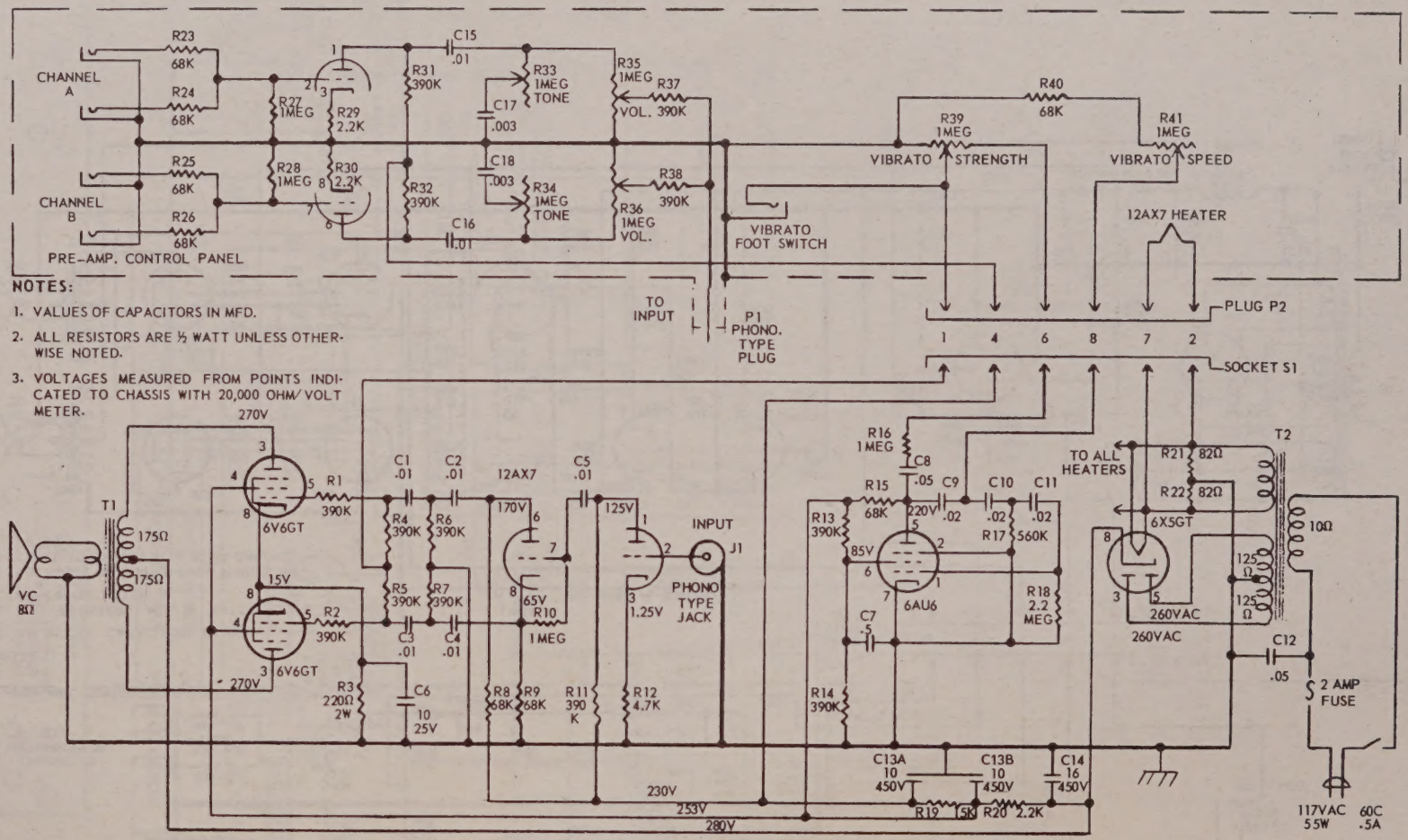




TUBE LAYOUT, PRE-AMP. CONTROL PANEL



TUBE LAYOUT, LOWER CHASSIS



MUSICAL INSTRUMENT AMPLIFIER MODELS GDR-8514A, GDR-8515A,
SCHEMATIC DIAGRAM COURTESY MONTGOMERY WARD & CO.

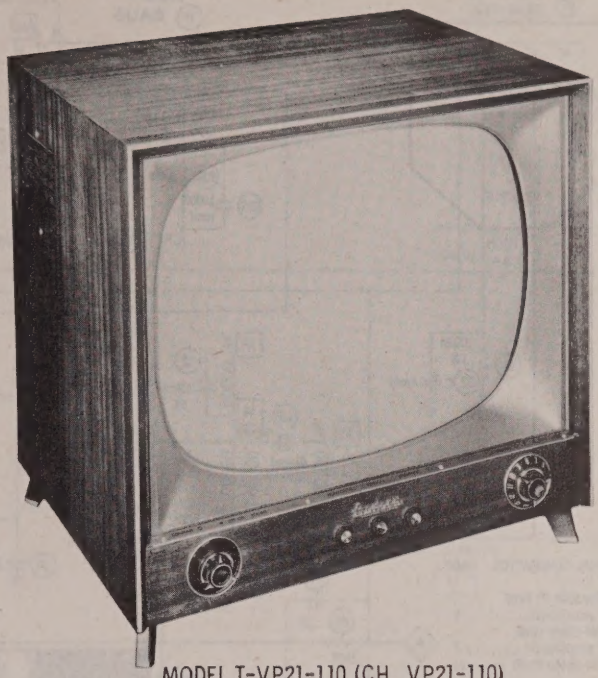
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type knobs from the front.
2. Remove 10 wood screws holding the rear cover. Remove tuner antenna terminal leads and the rear cover.
3. Remove speaker leads and 2 hex nuts holding the speaker. Remove speaker.
4. Remove 2 wood screws holding the top of the picture tube strap.
5. Remove 4 chassis bolts from the bottom.
6. Remove the chassis.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.



MODEL T-VP21-110 (CH. VP21-110)

TRADE NAME	Andrea	MODELS	CHASSIS
		BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110	VP21-110
MANUFACTURER	Andrea Radio Corp., 27-01 Bridge Plaza North, Long Island City, N.Y.		
TYPE SET	Television Receiver		
TUBES	Eighteen		
POWER SUPPLY	110-120 Volts AC, 50-60 Cycle	RATING 175 Watts, 1.69 Amp. @ 117 Volts AC, 60 Cycle	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible by removing the rear cover and supplying power to the receiver. Set the Fine Tuning at the center of its range. Three adjustment holes are located in the top of the tuner at the back. The HIGH band adjustment is the center adjustment and should be adjusted first. The LOW band adjustment is to the right. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 wood screws holding the trim strip at the bottom of the safety glass. Tilt glass out at the bottom and lower to remove.

FOCUS

No provision is made to vary the focus on this receiver.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

For adjustment of the Horizontal Oscillator, it is necessary to remove the rear cover and supply power to set. Set the Horizontal Hold at the center of its range and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart.)

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Ratio Detector Secondary (A7) located on top of chassis.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location, see tube placement chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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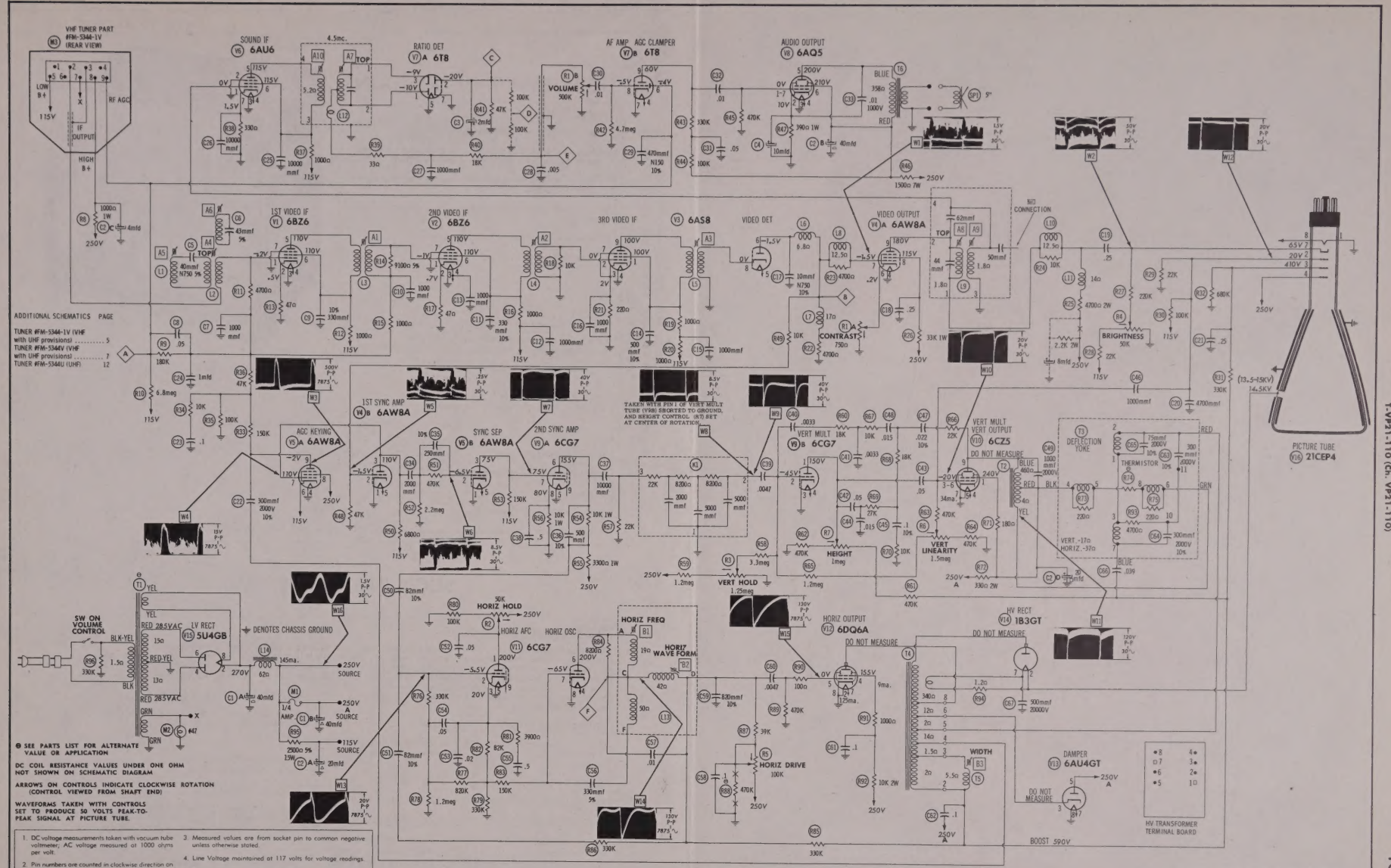
ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110 (Ch. VP21-110)

ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110 (Ch. VP21-110)

SET 413 FOLDER 1


VHF TUNER PART #FM-5344-1V (REAR VIEW)
SOUND IF V6 6AU6
RATIO DET V7A 6T8
AF AMP AGC CLAMPER V7B 6T8
AUDIO OUTPUT V8 6AQ5
VOLUME 500K
1ST VIDEO IF V1 6BZ6
2ND VIDEO IF V2 6BZ6
3RD VIDEO IF V3 6AS8
VIDEO DET
VIDEO OUTPUT V4A 6AW8A
CONTRAST 750Ω
BRIGHTNESS 50K
1ST SYNC AMP V4B 6AW8A
AGC KEYING V5A 6AW8A
SYNC SEP V5B 6AW8A
2ND SYNC AMP V9A 6CG7
VERT MULT 18K V5B 6CG7
VERT MULT VERT OUTPUT V10 6CZ5
DEFLECTION YOKE
THERMISTOR
VERT. LINEARITY 1.5meg
HEIGHT 1meg
VERT HOLD 1.25meg
PICTURE TUBE V16 21CEP4
ADDITIONAL SCHEMATICS PAGE
TUNER #FM-5344-1V (VHF with UHF provisions) 5
TUNER #FM-5344V (VHF with UHF provisions) 7
TUNER #FM-5344U (UHF) 12
SW ON VOLUME CONTROL
LV RECT 5U4GB
DENOTES CHASSIS GROUND
HORIZ HOLD 50K
HORIZ AFC
HORIZ OSC V11 6CG7
HORIZ FREQ
HORIZ WAVE FORM
HORIZ OUTPUT V12 6DQ6A
HV RECT V14 1B3GT
DO NOT MEASURE
HORIZ DRIVE 100K
WIDTH
DAMPER V13 6AU4GT
HV TRANSFORMER TERMINAL BOARD
BOOST 590V
NO CONNECTION
TAKEN WITH PIN 1 OF VERT MULT TUBE (V9B) SHORTED TO GROUND, AND HEIGHT CONTROL (R7) SET AT CENTER OF ROTATION.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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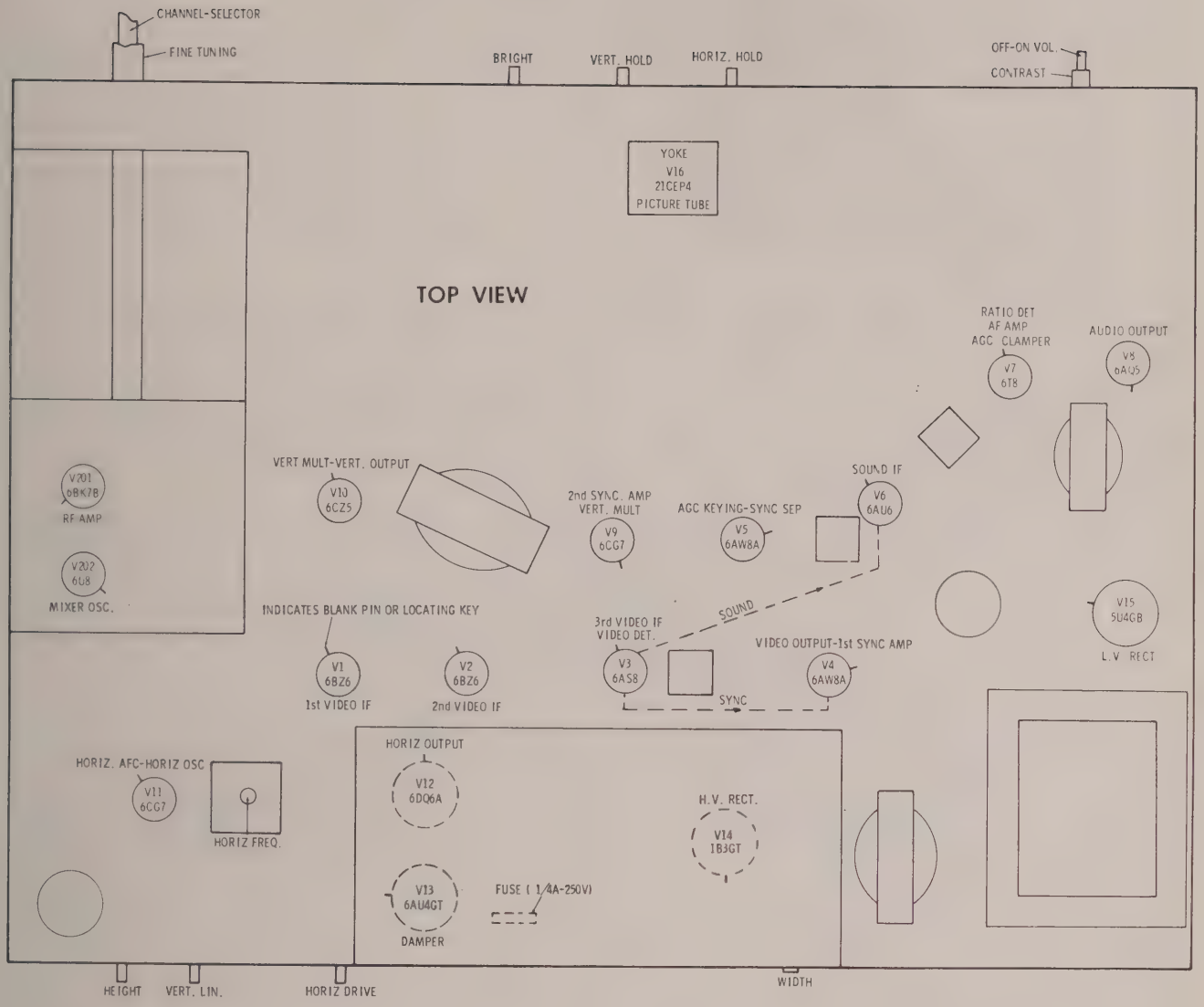
ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110 (Ch. VP21-110)

ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110 (Ch. VP21-110)

FOLDER 1

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound V15

SWEEP FAILURE
No raster, has sound Fuse (M1), V11, V12, V13, V14, V16
No vertical deflection V9, V10
Poor vert. linearity or foldover V9, V10
Poor horiz. linearity or foldover V11, V12, V13
Narrow picture V11, V12, V13, V15
Vert. off freq. V9, V10
Horiz. off freq. V11

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V16
Has pic, no sound V6, V7, V8
Overloaded picture V5

SYNC FAILURE
No vert. sync V4, V5, V9
No horiz. sync V4, V5, V9, V11
No vert. or horiz. sync V4, V5, V9

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point Ⓐ. Positive to chassis.
Attenuate sweep generator to maintain between 2 and 3 volts peak to peak on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001mfd	High side to pin 1 (grid) of 1st. Video IF (V1). Low side to chassis.	44.0MC (10MC Swp)	42.5MC 45.25MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point Ⓑ. Low side to chassis. (Across Video Det. load)	A1, A2, A3	Disconnect L2 from pin 1 (grid) of V1. Adjust A1 to place 45.75MC marker at 35% on curve as in Fig. 1. Adjust A2 for maximum gain and proper bandwidth. 42.5MC marker should be at 20% on curve. Adjust A3 for flat topped response. Repeat these adjustments. Reconnect L2 to V1.
2.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	"	41.25MC 42.5MC 45.25MC 45.75MC 47.25MC	"	"	A4, and Mixer Plate Coil	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown.
3.	"	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection.
4.	"	"	"	41.25MC	"	"	A6	"

SOUND IF ALIGNMENT

Connect two matched 100K (±1%) resistors in series from point Ⓒ to chassis. The junction of these two resistors is alignment point Ⓓ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.005mfd	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point Ⓒ. Common to chassis.	A7, A8, A9, A10	Use only enough generator output to provide a usable indication on VTVM, not to exceed 8 volts DC. Adjust for maximum deflection.
6.	"	"	"	"	DC probe to point Ⓓ. Common to point Ⓕ.	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 6.

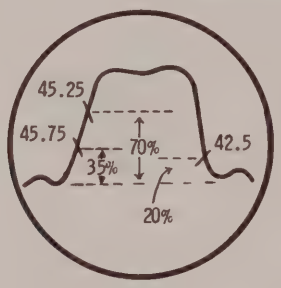


FIG.1

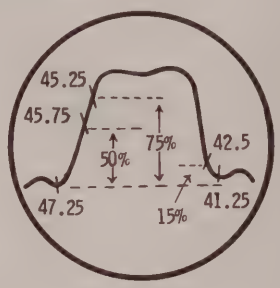
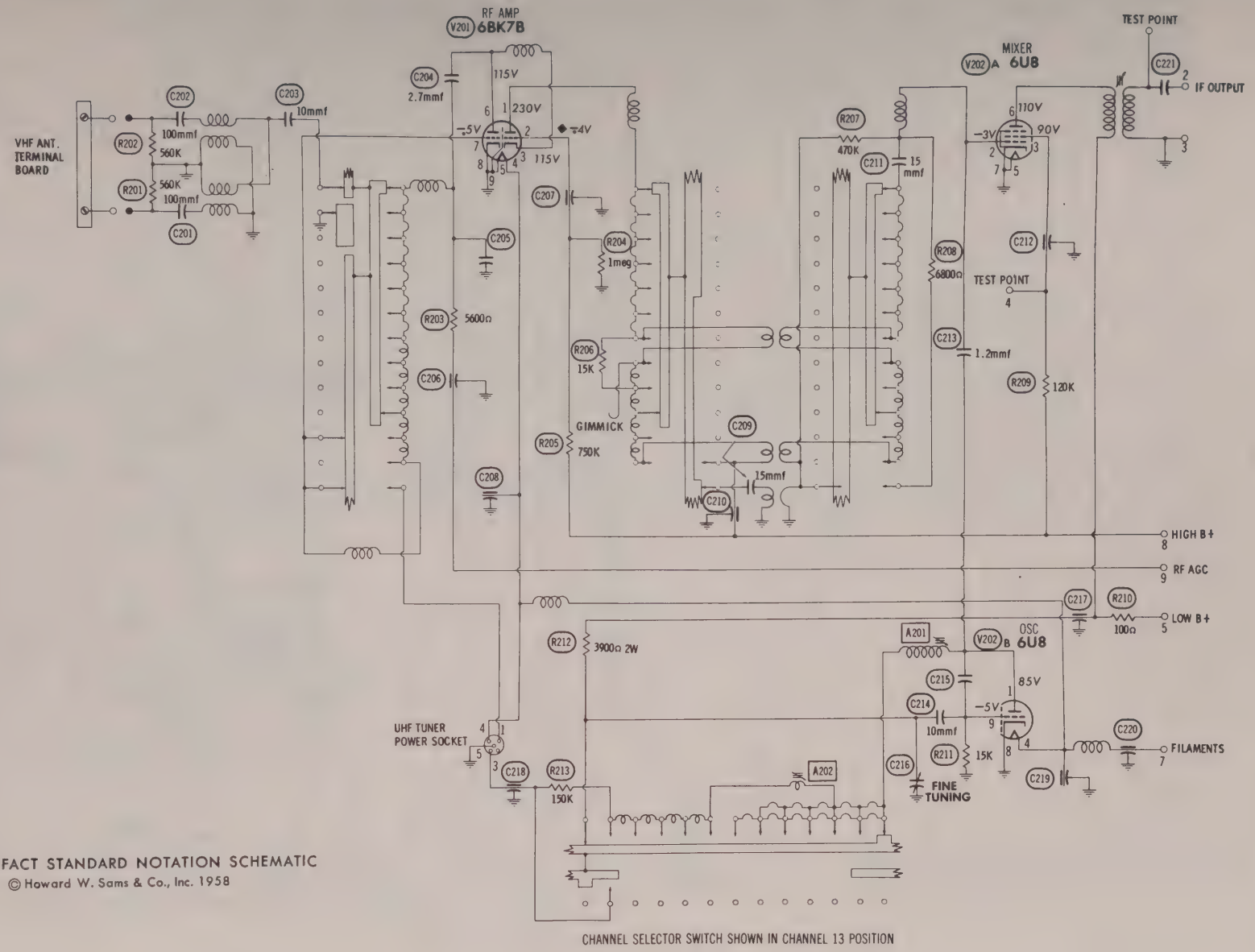


FIG.2



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VHF TUNER W/UHF PROVISIONS #FM-5344-1V

ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-140, LB-VP21-110, T-VP21-110 (Ch. VP21-110)

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	6BK7B	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	6U8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	ANDREA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	100			SI 100	D6-101	LT6T1	UC-531	5GA-T1	
C202	100			SI 100	D6-101	LT6T1	UC-531	5GA-T1	
C203	10			SI 10	D6-100	LT6Q1	UC-541	5GA-Q1	
C204	2.7								
C205									
C206									
C207									
C208									
C209	15			BPD-000015	DD-150	L10Q15	UC-5415	5GA-Q15	
C210									
C211	15			BPD-000015	DD-150	L10Q15	UC-5415	5GA-Q15	
C212									
C213	1.2								
C214	10			BPD-00001	DD-100	L10Q1	UC-541	5GA-Q1	
C215									
C216									
C217									
C218									
C219									
C220									
C221									

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		ANDREA PART No.	NOTES
	OHMS	WATT		
R201	560K			
R202	560K			
R203	5600Ω			
R204	1meg			
R205	750K			
R206	15K			
R207	470K			

ITEM No.	RATING		ANDREA PART No.	NOTES
	OHMS	WATT		
R208	6800Ω			
R209	120K			
R210	100Ω			
R211	15K			
R212	3900Ω	2		
R213	150K			

TUNER ALIGNMENT INSTRUCTIONS

VHF OSCILLATOR ALIGNMENT

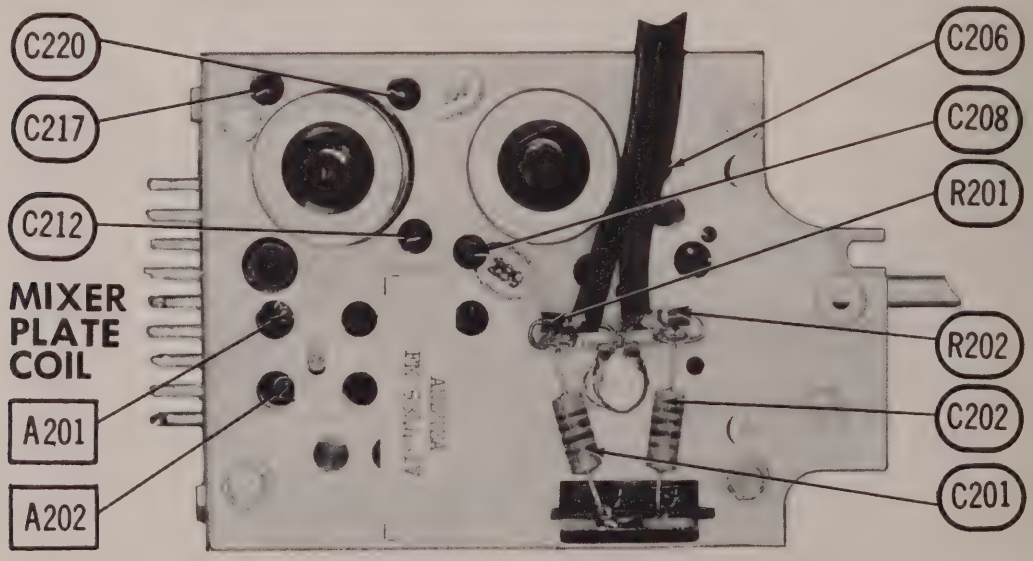
Set the Fine Tuning to the center of its range. Set the Channel Selector to the highest high band channel (13-7) operating in the area. Adjust the high band oscillator adjustment slug (A201) for best picture and sound.
Switch Channel Selector to the highest low band channel (6-2) operating in the area and adjust the low band oscillator adjustment (A202) for best picture and sound. Recheck high band adjustment.

VHF RF AND MIXER ALIGNMENT

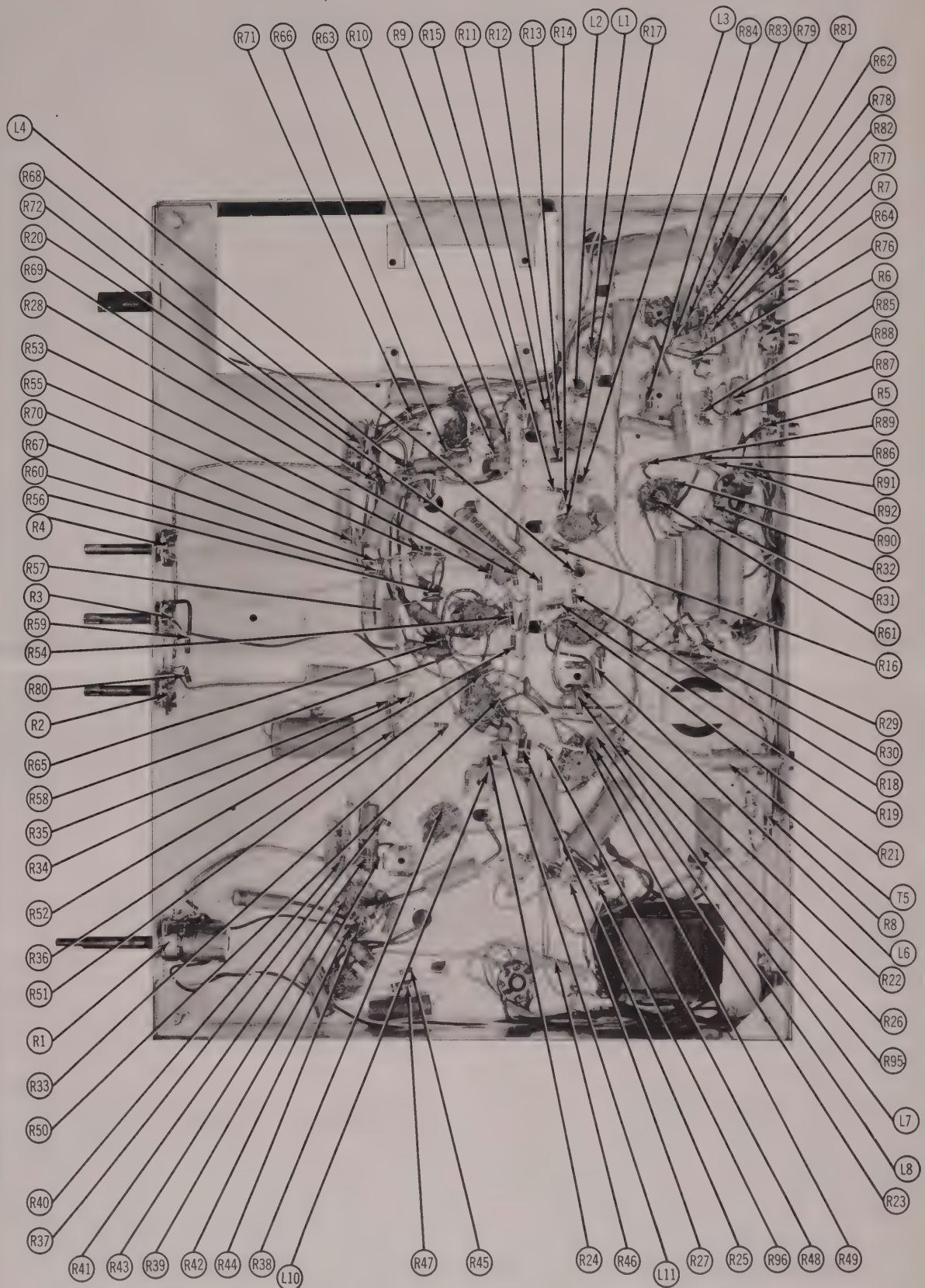
This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

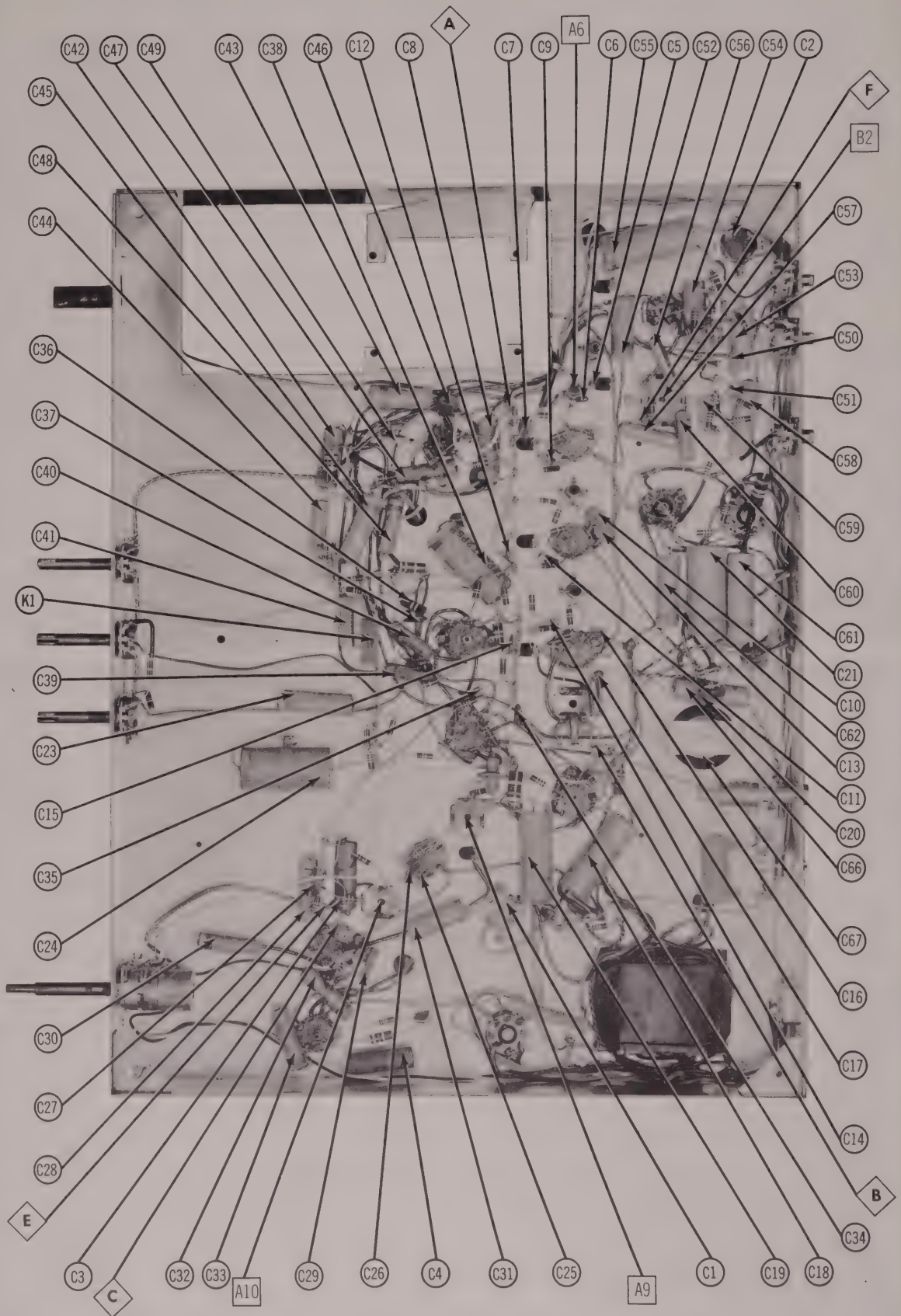


RF TUNER—TOP VIEW



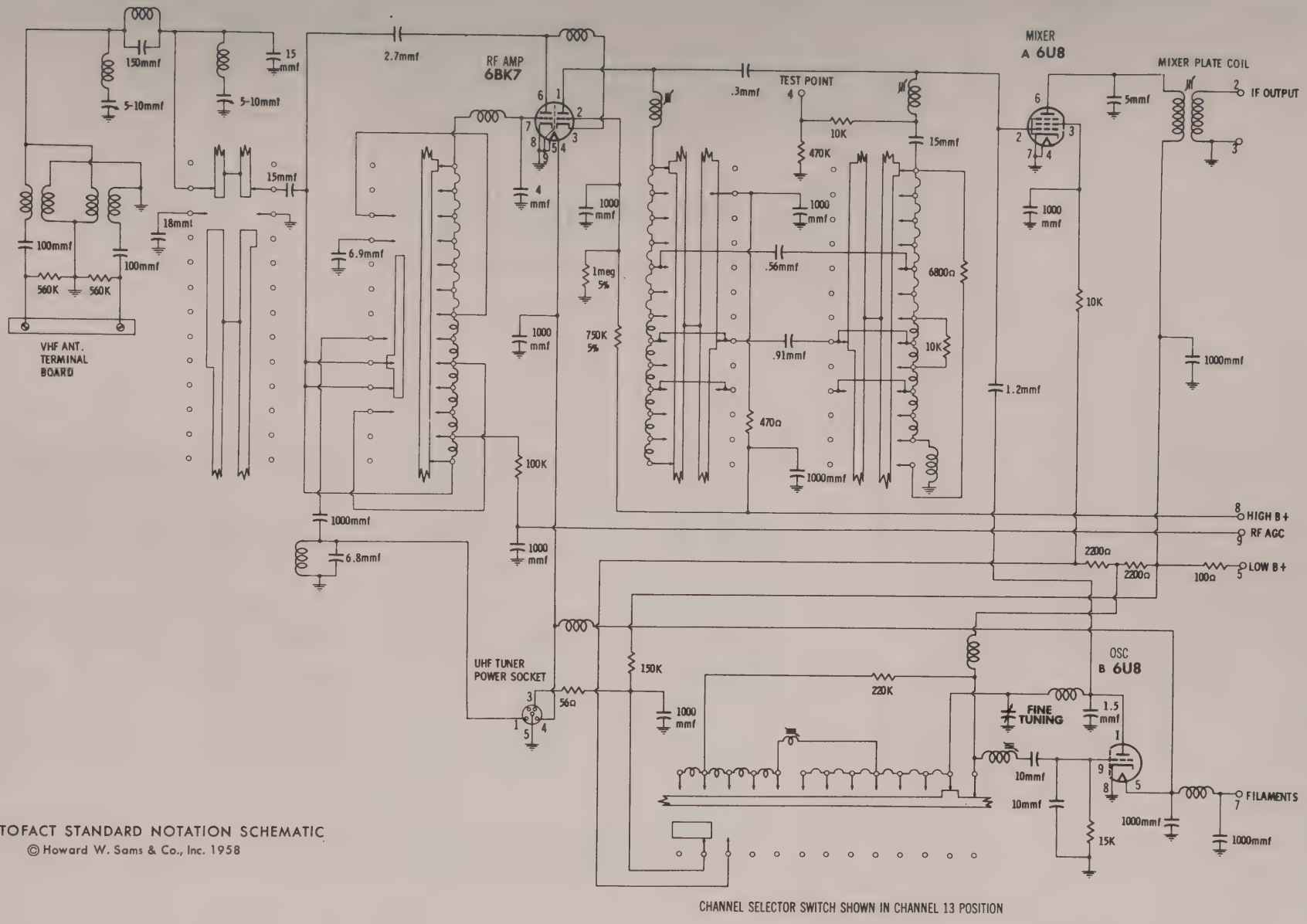
CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

ANDREA MODELS BLB-VP21-110, BT-VP21-110,
ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110,
T-VP21-110 (Ch. VP21-110)



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

ANDREA MODELS BLB-VP21-110, BT-VP21-110,
ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110
T-VP21-110 (Ch. VP21-110)



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

VHF TUNER W/UHF PROVISIONS #FM-5344V

ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110 (Ch. VP21-110)

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	1st Video IF Amp	6BZ6	
V2	2nd. Video IF Amp.	6BZ6	
V3	3rd. Video IF Amp. - Video Det	6AS8	
V4	Video Output- 1st Sync Amp.	6AW8A	
V5	AGC Keying-Sync Sep.	6AW8A	
V6	Sound IF Amp.	6AU6	
V7	Ratio Det -AF Amp. - AGC Clamper	6T8	
V8	Audio Output	6AQ5	
V9	2nd. Sync Amp. - Vert. Mult.	6CG7	
V10	Vert. Mult. - Vert. Output	6CZ5	
V11	Horiz. AFC-Horiz. Osc.	6CG7	
V12	Horiz. Output	6DQ6A	
V13	Damper	6AU4GT	
V14	HV Rectifier	1B3GT	
V15	LV Rectifier	5U4GB	

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	ANDREA PART No.	GENERAL ELECTRIC PART No	RCA PART No.	SYLVANIA PART No.	
V16	21CEP4		21CEP4 ①	21CEP4 ②	① "Silverama" ② "Silver Screen 65"

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						
	CAP	VOLT	ANDREA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	450	HCE-1340 ①	AFH3-57	B0450	FP336	TMD-63	D-335	TVL-3764
B	▲40	450							
C2A	▲20	450	HCE-1360	AFH4-15-10	C0372 BR445	FP396.1 TC70	TMQ-18 TD-4-450	Q-060 MT-4504	TVL-4771.6
B	▲40	450							
C	4	450							
D	▲20	450							
C3	2	50	HCE-1343	PR850V2	BBR3-50	TC302	TD-2-50	MT-0502	TVA-1301
C4	10	25	HCE-1329	PR825V10	BBR10-25	TC22	TD-10-25	MT-0210	TVA-1304

① For 50 cycle operation C1A and C1B are 80mfd sections.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	ANDREA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	40		HCC-1907		TCN-39				N750 5%
C6	43			1469-000043		22R5Q43		MS-443	5%
C7	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C8	.05	400	HCT-1003	P488N-05	DF-503	CUB48S	GEM-415	47M-S5	
C9	330		HCC-1937		MD-331				10%
C10	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C11	330		HCC-1937		MD-331				10%
C12	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C13	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C14	500		HCM-1625A	1469-0005	MD-501	5R5T5	MCB245	MS-35	10%
C15	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C16	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C17	10		HCC-1923	N750-SI 10	TCN-10	CTA6QIU	NT-541	5TCU-Q1	N750 10%
C18	25	400	HCT-1015	P488N-25		CUB4P25	GEM-4025	47M-P25	
C19	25	400	HCT-1015	P488N-25		CUB4P25	GEM-4025	47M-P25	
C20	4700		HCC-1952-1	BPD-0047	DD-472	BYA10D47M	UC-5247	5HK-D47	
C21	.25	600	HCT-1016	P688N-25		CUB6P25	GEM-6025	67M-P25	
C22	300	2000	HCM-1618C2K						10%
C23	.1	200	HCT-1013	P288N-1	DF-104	CUB2P1	GEM-201	27M-P1	
C24	1.0	100	HCT-1027-1	P288N-1.0		CUB2W1	GEM-21	27M-M1	
C25	10000		HCC-1943	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C26	10000		HCC-1943	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C27	1000		HCC-1960	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C28	.005	600	HCT-1017	P688N-005	DS-502	CUB6D5	GEM-625	67M-D5	
C29	470		HCC-1935						N150 10%
C30	.01	600	HCT-1008	P688N-01	D6-103	CUB6S1	GEM-611	67M-S1	
C31	.05	400	HCT-1003	P488N-05	DF-503	CUB4S5	GEM-415	47M-S5	
C32	.01	600	HCT-1008	P688N-01	D6-103	CUB6S1	GEM-611	67M-S1	
C33	.01	1000	HCT-1009	P1088N-01	D6-103	CUB10S1	GEM-1011	10TM-S1	
C34	2000		HCC-1944	BPD-002	DD-203	BYA10D2	DC523	5HK-D2	
C35	250		HCM-1634C	1469-00025	MD-251	22R5T25		MS-325	10%
C36	500		HCM-1625A	1469-0005	MD-501	5R5T5	MCB245	MS-35	10%
C37	10000		HCC-1943	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C38	.5	200	HCT-1033	P288N-5		CUB2P5	GEM-205	27M-P5	
C39	.0047	400	HCT-1055	P488N-0047	D6-472	CUB6D47	GEM-6247	67M-D47	
C40	.0033	400	HCT-1056	P488N-0033	D6-332	CUB6D33	GEM-6233	67M-D33	
C41	.0033	400	HCT-1056	P488N-0033	D6-332	CUB6D33	GEM-6233	67M-D33	
C42	.05	400	HCT-1003	P488N-05	DF-503	CUB4S5	GEM-415	47M-S5	
C43	.05	400	HCT-1003	P488N-05	DF-503	CUB4S5	GEM-415	47M-S5	
C44	.015	400	HCT-1023	P488N-015		CUB4S15	GEM-4115	47M-S15	
C45	1	400	HCT-1068						10%
C46	1000		HCC-1932	BPD-001	DD-102	BYA5DI	DC521	5HK-DI	
C47	.022	400	HCT-1057						10%
C48	.015	400	HCT-1023	P488N-015		CUB6S15	GEM-4015	47M-S15	
C49	1000	2000	HCC-1966	HVD-30-1000	DD30-102	HVB30DI	DC3021	30GA-DI	
C50	82		HCM-1653A	1469-000082	DD-820	22R5Q82		MS-482	10%
C51	82		HCM-1653A	1469-000082	DD-820	22R5Q82		MS-482	10%
C52	.05	400	HCT-1003	P488N-05	DF-503	CUB4S5	GEM-415	47M-S5	
C53	.02	600	HCT-1030	P688N-02	DD-203	CUB6S2	GEM-612	67M-S2	
C54	.05	400	HCT-1003	P488N-05	DF-503	CUB4S5	GEM-415	47M-S5	
C55	.5	200	HCT-1033	P288N-5		CUB2P5	GEM-205	27M-P5	
C56	330		HCM-1652	1469-00033	DD-331	5R5T33		MS-333	5%
C57	.01	600	HCT-1008	P688N-01	D6-103	CUB6S1	GEM-611	67M-S1	
C58	.1	400	HCT-1045	P488N-1	DF-104	CUB4P1	GEM-401	47M-P1	
C59	820		HCM-1630A	1469-00082		1R5T82		MS-382	10%
C60	.0047	400	HCT-1055	P488N-0047	D6-472	CUB6D47	GEM-6247	67M-D47	
C61	.1	600	HCT-1002	P688N-1	DF-104	CUB6P1	GEM-601	67M-P1	
C62	.1	400	HCT-1045	P488N-1	DF-104	CUB4P1	GEM-401	47M-P1	
C63	300	2000	HCC-1934		DD30-301			30GA-T3	10%
C64	300	2000	HCC-1934		DD30-301			30GA-T3	10%
C65	75	2000	HCC-1965		DD30-750	HVD30Q75		30GA-Q75	10%
C66	.039	600	HCT-1061	P688N-04	D6-403	CUB6S4	GEM-614	67M-S4	
C67	500	20000	HCR-2706-1	UV-502	TV2-502	MMU2007S	HV-20035A	20Dh-T5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ANDREA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	750Ω	½	GRV-845	F3-2	RTV-546		*UX3842S	Contrast
B	500K	½		R2-61	Not Req.			Volume
C	Switch			KR-1 or KB-1*	Not Req.			
R2A	50K	½	GRV-847	B-31	A47-50K-S	Q11-133	U36	Horiz. Hold
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R3A	1.25meg	½	GRV-848	B-741	A47-1.5meg-S	Q11-139	U136	Vert. Hold
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R4A	50K	½	GRV-847	B-31	A47-50K-S	Q11-133	U36	Brightness
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R5A	100K	½	GRV-868		B47-100K-S	B11-138	TA18L	Horiz. Drive
B	Shaft				Not Req.	TM3	Not Req.	
R6A	1.5meg	½	GRV-861		B47-1.5meg-S	B11-136	TA15L	Vert. Lin.
B	Shaft				Not Req.	TM3	Not Req.	
R7A	1meg	½	GRV-866		B47-1meg-S	B11-137	TA16L	Height
B	Shaft				Not Req.	TM3	Not Req.	

* Use KR-1 on CRL "red label" controls and KB-1 on "blue label" controls.
● "STA-LOC" Equivalent : FC75IR, OF1875, RU55A, IS2562, USA.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		ANDREA PART No.	NOTES
	OHMS	WATT		
R8	1000Ω	1	GRC-231	
R9	180K		GRC-336	
R10	6.8meg		GRC-340	
R11	4700Ω		GRC-205	
R12	1000Ω		GRC-332	
R13	47Ω		GRC-221	
R14	9100Ω 5%		GRC-335	
R15	1000Ω		GRC-210	
R16	1000Ω		GRC-332	
R17	47Ω		GRC-211	
R18	10K		GRC-304	
R19	1000Ω		GRC-210	
R20	1000Ω		GRC-210	
R21	2200Ω		GRC-218	
R22	4700Ω		GRC-205	
R23	4700Ω		GRC-205	
R24	10K		GRC-304	
R25	4700Ω	2	GRC-236	
R26	33K	1	GRC-281	
R27	220K		GRC-270	
R28	22K		GRC-301	
R29	22K		GRC-201	
R30	100K		GRC-358	
R31	330K		GRC-301	
R32	680K		GRC-302	
R33	150K		GRC-243	
R34	10K		GRC-304	
R35	100K		GRC-225	
R36	47K		GRC-207	
R37	1000Ω		GRC-210	
R38	330Ω		GRC-329	
R39	33Ω		GRC-389	
R40	18K		GRC-304	
R41	47K		GRC-207	
R42	4.7meg		GRC-242	
R43	330K		GRC-301	
R44	100K		GRC-225	
R45	470K		GRC-228	
R46	1500Ω	7	GRW-542	
R47	390Ω	1	GRC-277	
R48	47K		GRC-207	
R49	10K		GRC-304	
R50	6800Ω		GRC-231	
R51	470K		GRC-228	
R52	2.2meg		GRC-230	
R53	150K		GRC-243	
R54	10K	1	GRC-232	
R55	3300Ω	1	GRC-254	
R56	10K	1	GRC-232	
R57	22K		GRC-301	
R58	3.3meg		GRC-339	
R59	1.2meg		GRC-359	
R60	18K		GRC-330	
R61	470K		GRC-228	
R62	470K		GRC-228	
R63	470K		GRC-228	
R64	470K		GRC-228	
R65	1.2meg		GRC-359	
R66	22K		GRC-201	
R67	10K		GRC-304	
R68	18K		GRC-330	
R69	27K		GRC-324	
R70	10K		GRC-304	
R71	180Ω		GRC-325	
R72	330Ω	2	GRC-333	
R73	220Ω		GRC-218	
R74				Note 1
R75	220Ω		GRC-218	
R76	330K		GRC-301	
R77	820K		GRC-246	
R78	1.2meg		GRC-359	
R79	330K		GRC-301	
R80	100K		GRC-258	
R81	39000		GRC-249	
R82	82K		GRC-241	
R83	150K		GRC-243	
R84	82000		GRC-285	
R85	330K		GRC-301	
R86	330K		GRC-301	
R87	39K		GRC-247	
R88	470K		GRC-228	Note 2
R89	470K		GRC-228	
R90	100Ω		GRC-216	
R91	10000		GRC-220	
R92	10K	2	GRC-267	
R93	4700Ω		GRC-205	
R94	1.2Ω		GRW-564	
R95	2500Ω 5%	15	GRW-545	
R96	330K		GRC-301	

Note 1. Temperature compensating resistor.
Note 2. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		ANDREA PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	47.25MC Trap	SA-381	20-1049				Includes 41.25MC Trap
L2	1st. Video IF	SA-377A					
L3	2nd. Video IF	SA-378	17-4523	TV-130	6219	VF-3	
L4	3rd. Video IF	SA-379	17-4522	TV-130	6219	VF-3	
L5	4th. Video IF	SA-380	17-5004	TV-128	6234		
L6	Resonant Choke	SA-349					52.3 Microhenries
L7	Shunt Peaking Coil	SA-382	19-3500	TV-204	6144	VP-8	540 Microhenries
L8	Series Peaking Coil	SA-384	19-3250	TV-196	6130	VP-6	270 Microhenries
L9A	4.5MC Trap	SA-373					
B	Sound IF						
L10	Series Peaking Coil	SA-384	19-3250	TV-196	6130	VP-6	270 Microhenries
L11	Shunt Peaking Coil	SA-350	19-3300	TV-200	6132	VP-7	330 Microhenries
L12	Ratio Det.	SA-374	17-3497	TV-115	6205	SD-4	

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES		ANDREA PART No.	REPLACEMENT DATA					NOTES
	PRI	SEC		Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	
LJ3	69Ω *		SA-335	20-1402 ▲	TV-162	6183-A	H-100	HS-9 ▲	Waveform coil -43Ω

* Tapped ② 50Ω. ▲ Reverse coil mounting in shield.

FILTER CHOKE

ITEM No	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES	INDUCTANCE @ CURRENT (1000 ~)	ANDREA PART No	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
LJ4	.300A	82Ω	1.98 Hy.	ST-3065	C5037 ①	C-2996 ①	F-803	C-2338 ①	26C44	C-17X ①

① Drill new mounting hole.

TRANSFORMER (POWER)

ITEM No	RATING			REPLACEMENT DATA						
	PRI	SEC 1	SEC 2	ANDREA PART No	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	117VAC @ 1.69A	540VCT @ 300A	5VAC @ 3A	ST-3082 ①						
	SEC 3	SEC 4	SEC 5							
	6.3VAC @ 9 1A									

① Part #ST-3069 used in chassis designed for 50 cycle operation.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							NOTES
		ANDREA PART No.	Halldorson PART No	Merit PART No.	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No	
T2	Vert. Output	ST-3097		A-3829		VO-101	26B14	A-113X ①	
T3 A	Yoke-Horiz. (19MH) (100)-Vert. (3.5MH)	ST-3096			Y-110 ①	DY-27A ②	Y-52 ②	Y-60 ②	
B	Yoke Clamp	EP-987							
T4	Horiz. Output	ST-3095				HO-289 *			
T5	Width Coil (1.8-10MH)	SA-348		MWC-8	20LR12 ③	WC-8A	WC-22 ③	WLC-5	

① Connect as autoformer.
② Use original rear cover, centering device and yoke damping network.
③ Drill new mounting hole.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8				5		
	6				4		
	5				3		
	4				2		
	3				2		
	2				1		
Connect Width Coil Across	3 & 2				2 & 1		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ANDREA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	4400Ω	3-4Ω	ST-3081	Z1008	A-3019	AU-804	A-8082	26S49	S-5Z	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ANDREA PART No	QUAM PART No	
SP1	5"	PM	3-4Ω	SL-4018	5A1	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ANDREA PART No.	REPLACEMENT DATA	
K1	Vert. Integrator	2000mmf, 5000mmf, 5000mmf, 22K, 6300Ω, 8300Ω	FM-5389	Aerovox	PA-501
				Centralab	PC-104
				Cornell-Dubilier	1B7M1
				Sprague	V-3

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ANDREA PART No.		LITTELFUSE PART No.		BUSS PART No	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG FT	1/4A 250V			318.250 (1/4A-250V)		GJV 1/4	

ANDREA MODELS BLB-VP21-110, BT-VP21-110, ET-VP21-110, FLB-VP21-110, FT-VP21-110, LB-VP21-110, T-VP21-110 (CH. VP21-110)

FOLDER 1

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	ANDREA PART No.	NOTES
M2	Lamp		#47
M3	Tuner	FM-5344-1V	VHF
	Tuner	FM-5344V	VHF
	Tuner	FM-5344U	UHF

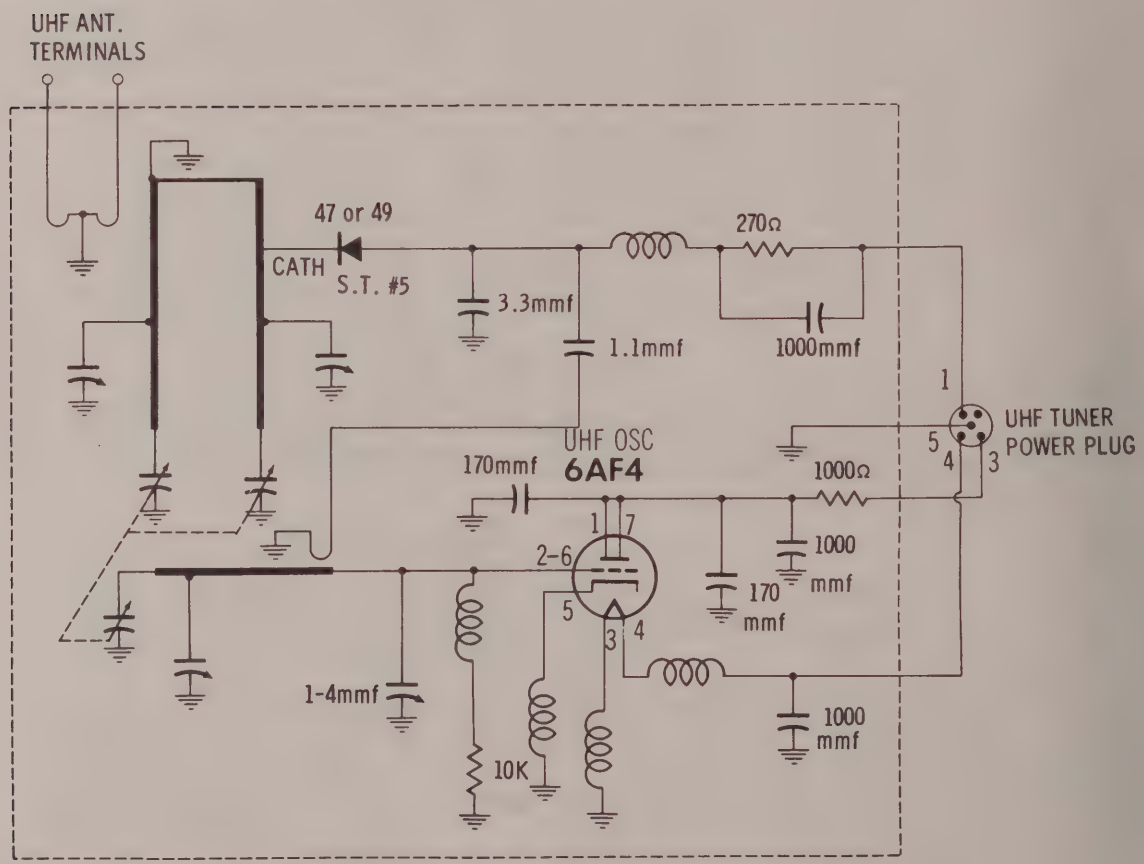
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	FM-5343	
Mask	EP-842A	
Knob	FM-5351	Channel Selector
Knob	FM-5349	VHF Fine Tuning
Knob	FM-5348	On-Off-Volume
Knob	FM-5352	Contrast
Knob	FM-5350	3 used

WIRING DATA

High Voltage Lead	Use BELDEN No.	8869
Shielded Hook-up Wire	Use BELDEN No.	8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No.	8874
300Ω Tuner Input Lead	Use BELDEN No.	8225
300Ω Antenna Lead-in	Use BELDEN No.	8230 or 8275
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor



UHF TUNER PART #FM-5344U

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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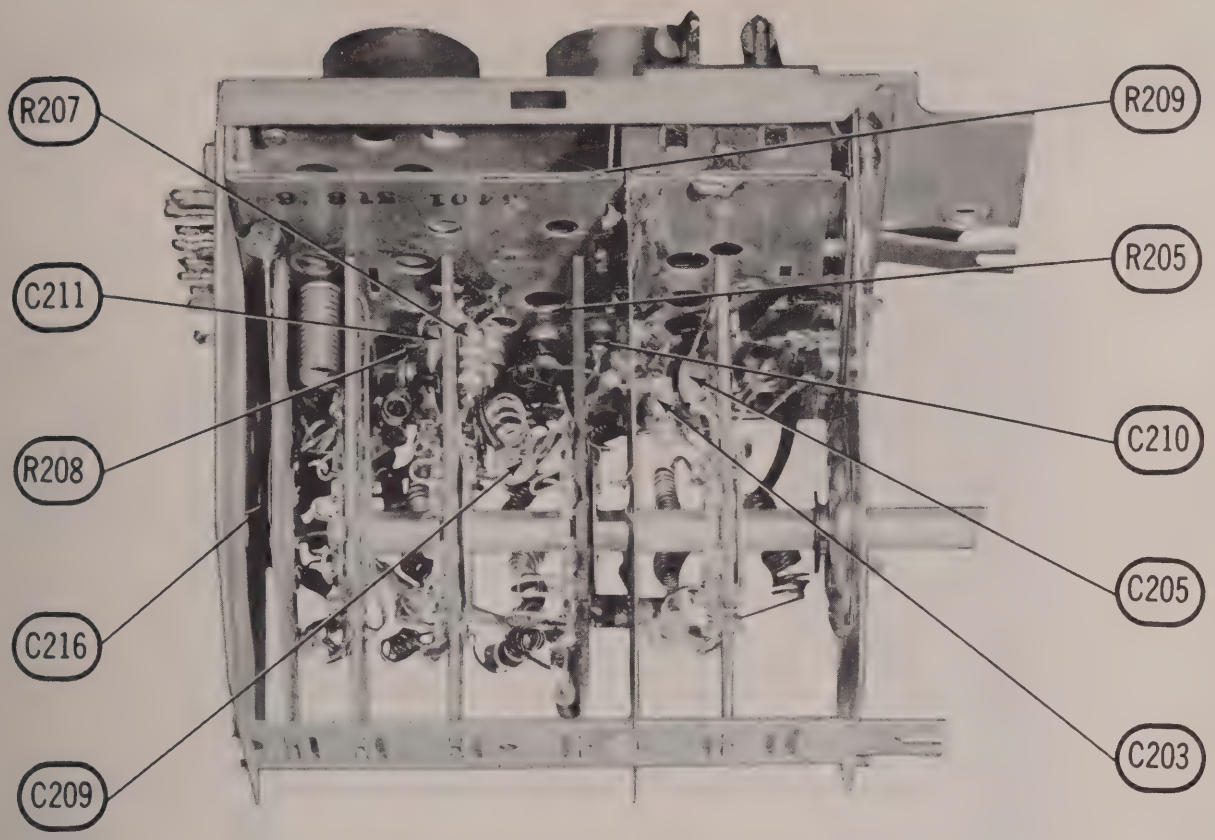
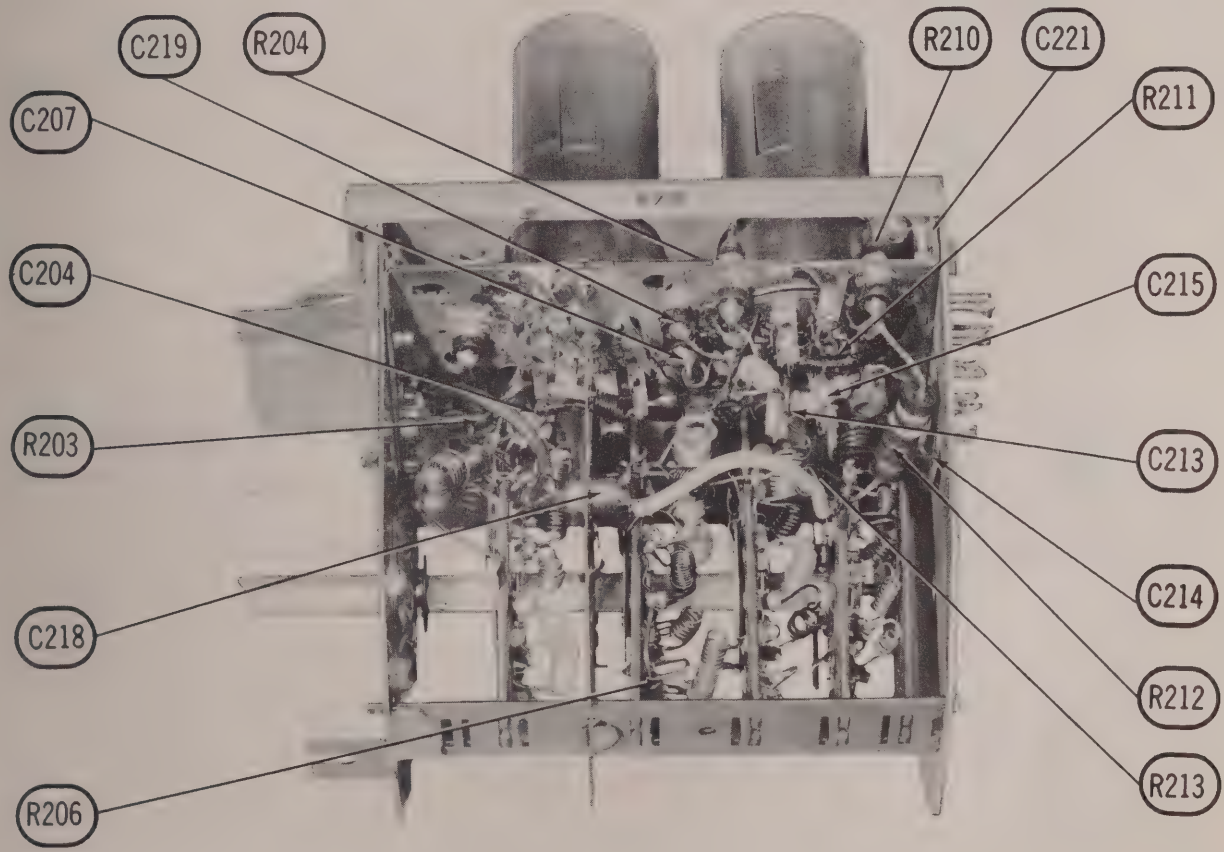
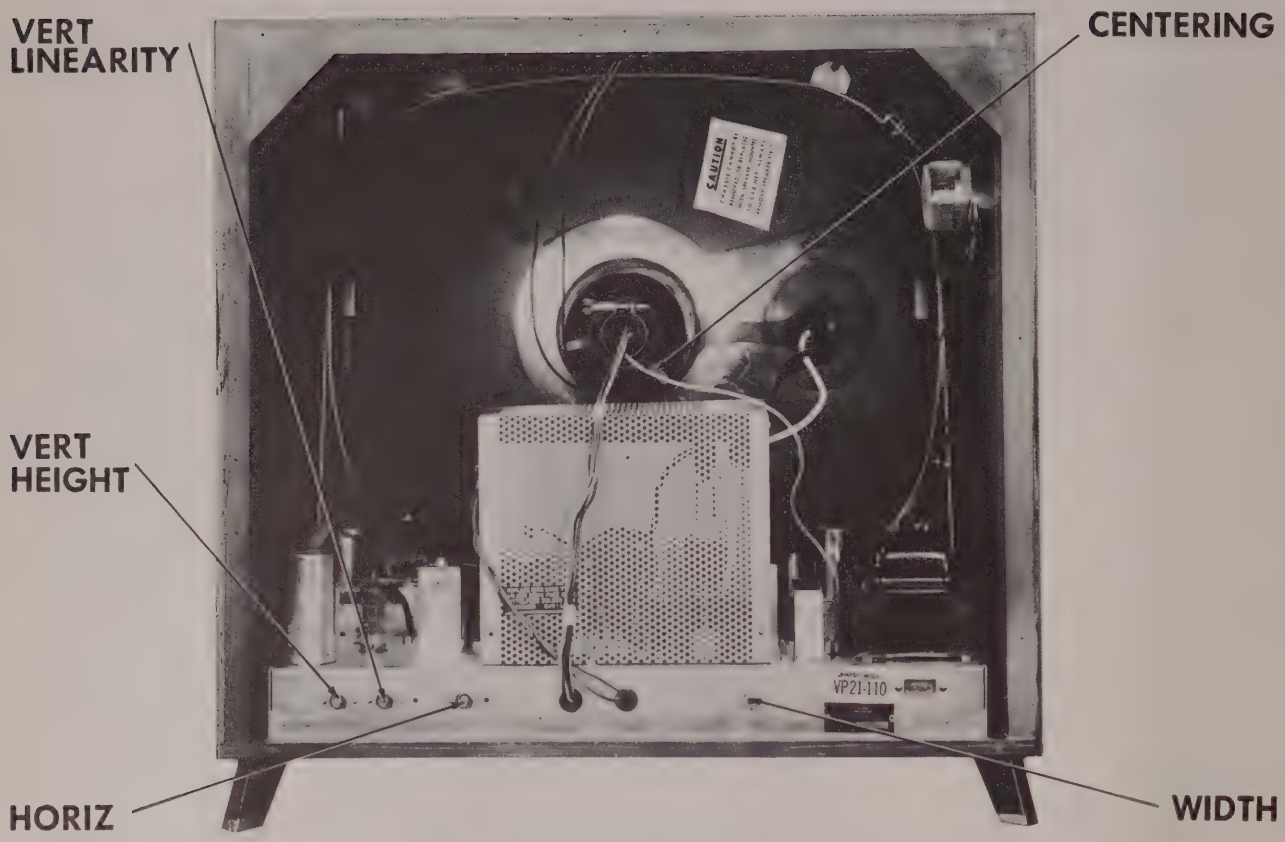


RF TUNER - LEFT SIDE



RF TUNER - RIGHT SIDE



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Adjust for normal picture and sound. Set the Horizontal Hold at the center of its range.

Adjust Horizontal Frequency (B1) until the picture synchronizes horizontally.

Connect the vertical amplifier of a scope thru a 10mmf capacitor to point (F). Low side to chassis.

Adjust Horizontal Waveform (B2) for waveform similar to Fig. 3 with the broad and narrow peaks of equal amplitudes. While making this adjustment, keep picture synchronized horizontally with B1.

Adjust Horizontal Drive until a vertical white drive line appears in the picture, then back off until drive line disappears.

Adjust Width (B3) for a picture SLIGHTLY wider than necessary to fill the picture mask horizontally.

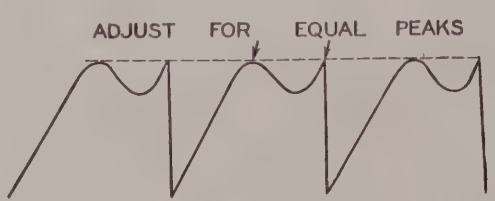


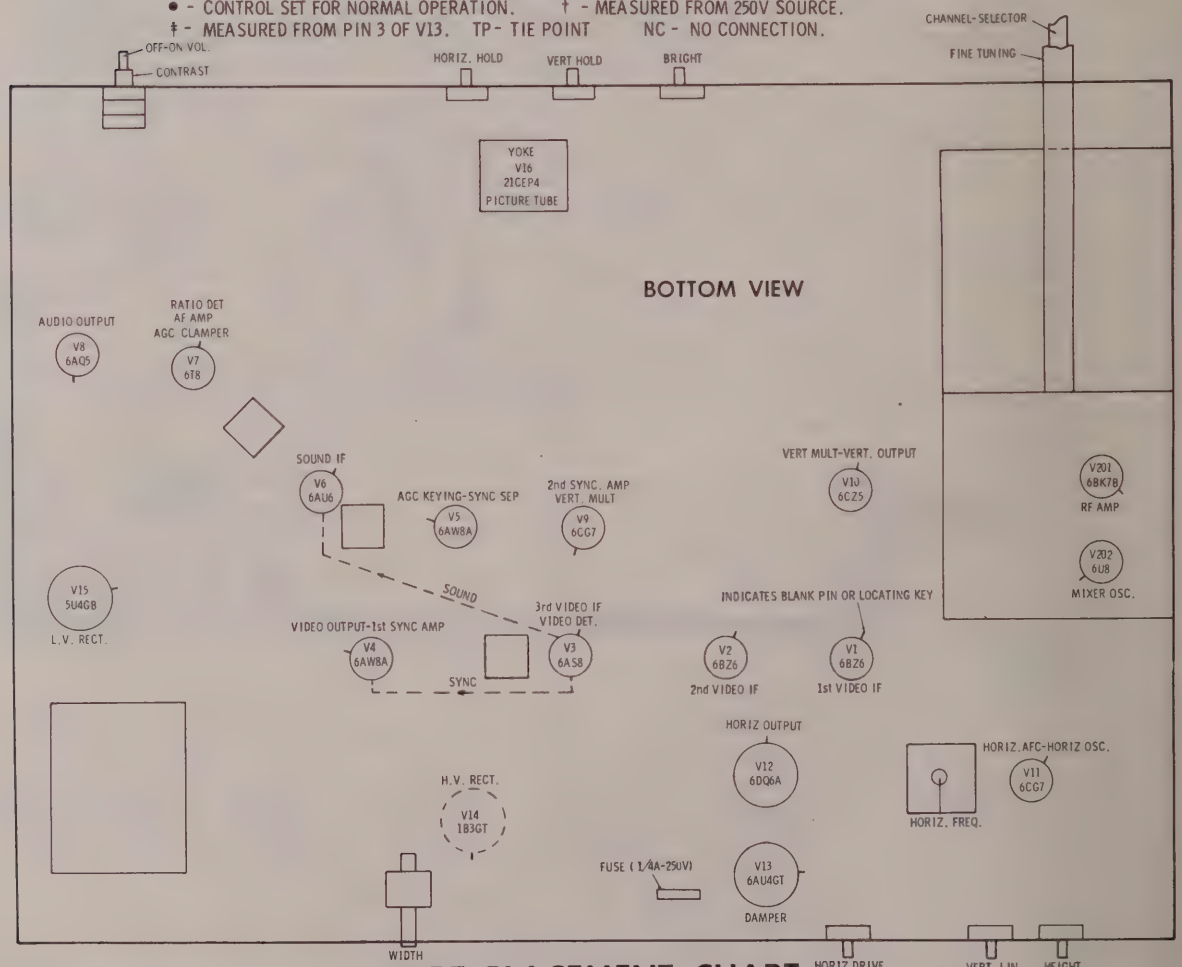
FIG. 3

CHASSIS TOP VIEW

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	130K	47Ω	0Ω	.1Ω	†3500Ω	†3500Ω	0Ω		
V2	6BZ6	130K	47Ω	0Ω	.1Ω	†3500Ω	†3500Ω	0Ω		
V3	6AS8	†4500Ω	.1Ω	220Ω	0Ω	.1Ω	4500Ω	220Ω	.1Ω	†4500Ω
V4	6AW8A	0Ω	11.5K	†9300Ω	0Ω	.1Ω	• 550Ω	4500Ω	†33K	†4700Ω
V5	6AW8A	0Ω	2.7meg	†150K	0Ω	.1Ω	†2500Ω	†9300Ω	†0Ω	250K
V6	6AU6	1.8Ω	0Ω	0Ω	.1Ω	†3500Ω	†3500Ω	330Ω		
V7	6T8	550K	47K	550K	.1Ω	0Ω	270K	0Ω	4.7meg	†430K
V8	6AQ5	470K	390Ω	0Ω	.1Ω	†1800Ω	†1500Ω	470K		
V9	6CG7	ǂ 550K	• 1.5meg	0Ω	.1Ω	0Ω	†13K	†150K	10K	NC
V10	6CZ5	†510Ω	TP	•1.4meg	.1Ω	0Ω	• 1.4meg	0Ω	NC	†790Ω
V11	6CG7	• †20K	780K	330K	.1Ω	0Ω	ǂ 230K	480K	0Ω	NC
V12	6DQ6A	TP	0Ω	TP	†11K	470K	TP	.1Ω	0Ω	TOP CAP ǂ10Ω
V13	6AU4GT	TP	NC	¶240K	NC	†0Ω	TP	.1Ω	0Ω	
V14	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ǂ350Ω
V15	5U4GB	TP	¶	NC	13Ω	NC	15Ω	NC	¶	
V16	21CEP4	0Ω	16K	ǂ220K	†0Ω	NC	NC	• 240K	.1Ω	
V201	6BK7B	†1000Ω	430K	INF	.1Ω	0Ω	INF	280K	0Ω	0Ω
V202	6U8	†6500Ω	470K	†120K	.1Ω	0Ω	†2600Ω	0Ω	0Ω	15K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ - THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR.
• - CONTROL SET FOR NORMAL OPERATION. † - MEASURED FROM 250V SOURCE.
ǂ - MEASURED FROM PIN 3 OF V13. TP - TIE POINT NC - NO CONNECTION.



TUBE PLACEMENT CHART

PHOTOFACT* Folder
EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type knobs from the side.
2. Remove 8 metal screws holding the rear cover. Remove the rear cover.
3. Remove speaker leads.
4. Remove 6 metal screws holding the top of the cabinet. Remove the top.
5. Remove the picture tube socket, yoke plug, yoke clamp, yoke and HV lead.
6. Remove isolation network from side of cabinet.
7. Remove 1 bolt thru side of cabinet holding control bracket.
8. Remove 2 chassis bolts from the sides, 2 from the bottom.
9. Remove the chassis.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS.
Care should be exercised when connecting test equipment or physically contacting the chassis.

MODEL 1731 (CH. 775-57)

TRADE NAME	Trav-Ler	MODELS	CHASSIS
		1730	729-26
		1731	775-57
MANUFACTURER	Trav-Ler Radio & Tele. Corp., 571 W. Jackson Blvd., Chicago 6, Illinois		
TYPE SET	Television Receiver		
TUBES	Thirteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 100 Watts, 1.05 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

TRAV-LER MODELS
1730, 1731 (Ch. 729-26, 775-57)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible by removing the Channel Selector and Fine Tuning knobs. Set the Fine Tuning at the center of its range. One slug for HIGH band adjustment is located at 4 o'clock, and should be adjusted first. The LOW band adjustment is located at 9 o'clock. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube, and safety glass cleaning, it is necessary to remove the chassis. (See disassembly instructions.)

FOCUS

No provision is made to vary the focus on this receiver.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

For adjustment of the Horizontal Oscillator, it is necessary to remove the rear cover and supply power to set. Set the Horizontal Hold at the center of its range and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart.)

FUSE DEVICE

A 5Ω fusible resistor (R67) is used for low voltage power supply protection. (For location, see tube placement chart.)

CENTERING

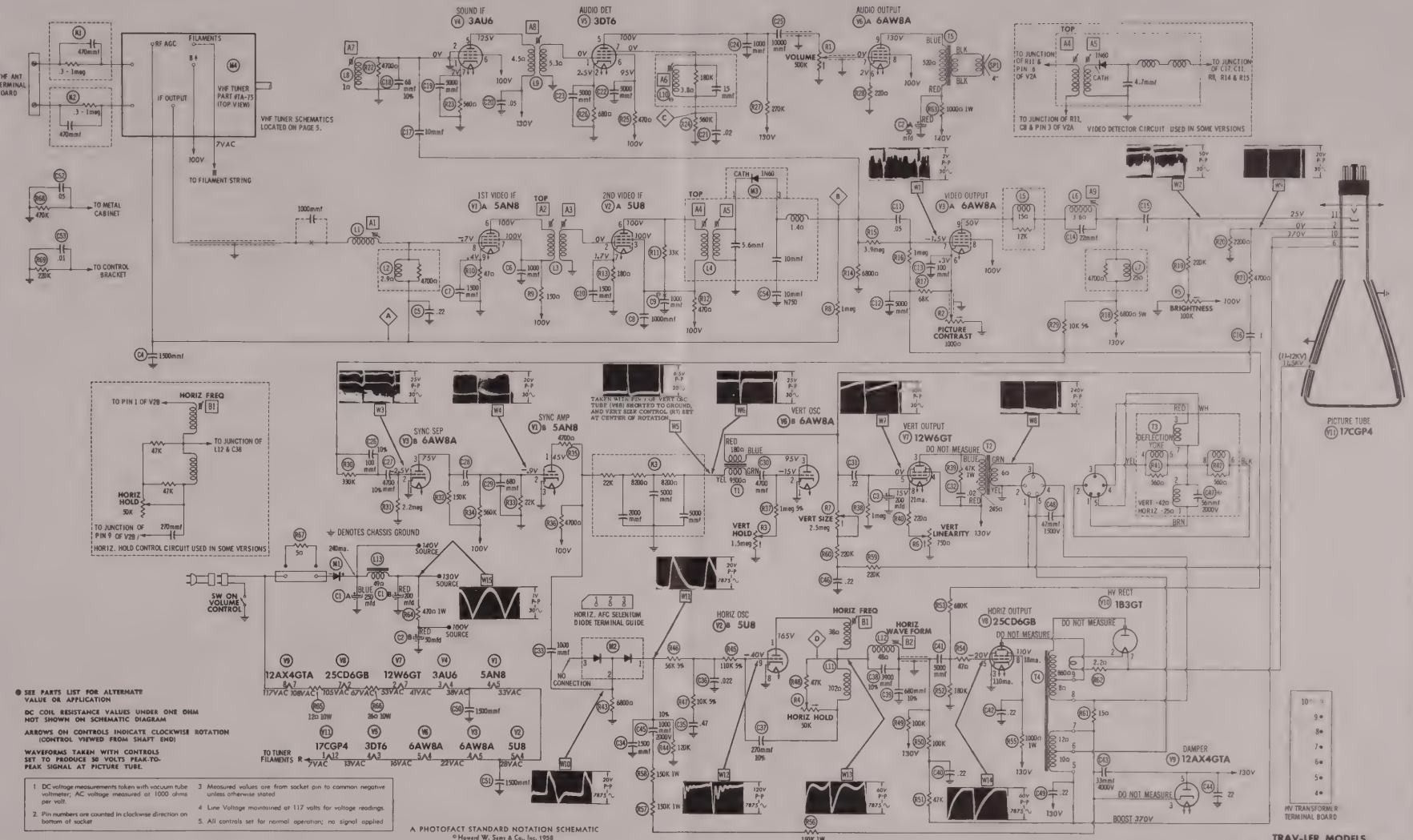
Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

SET 413 FOLDER 2

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

H688



● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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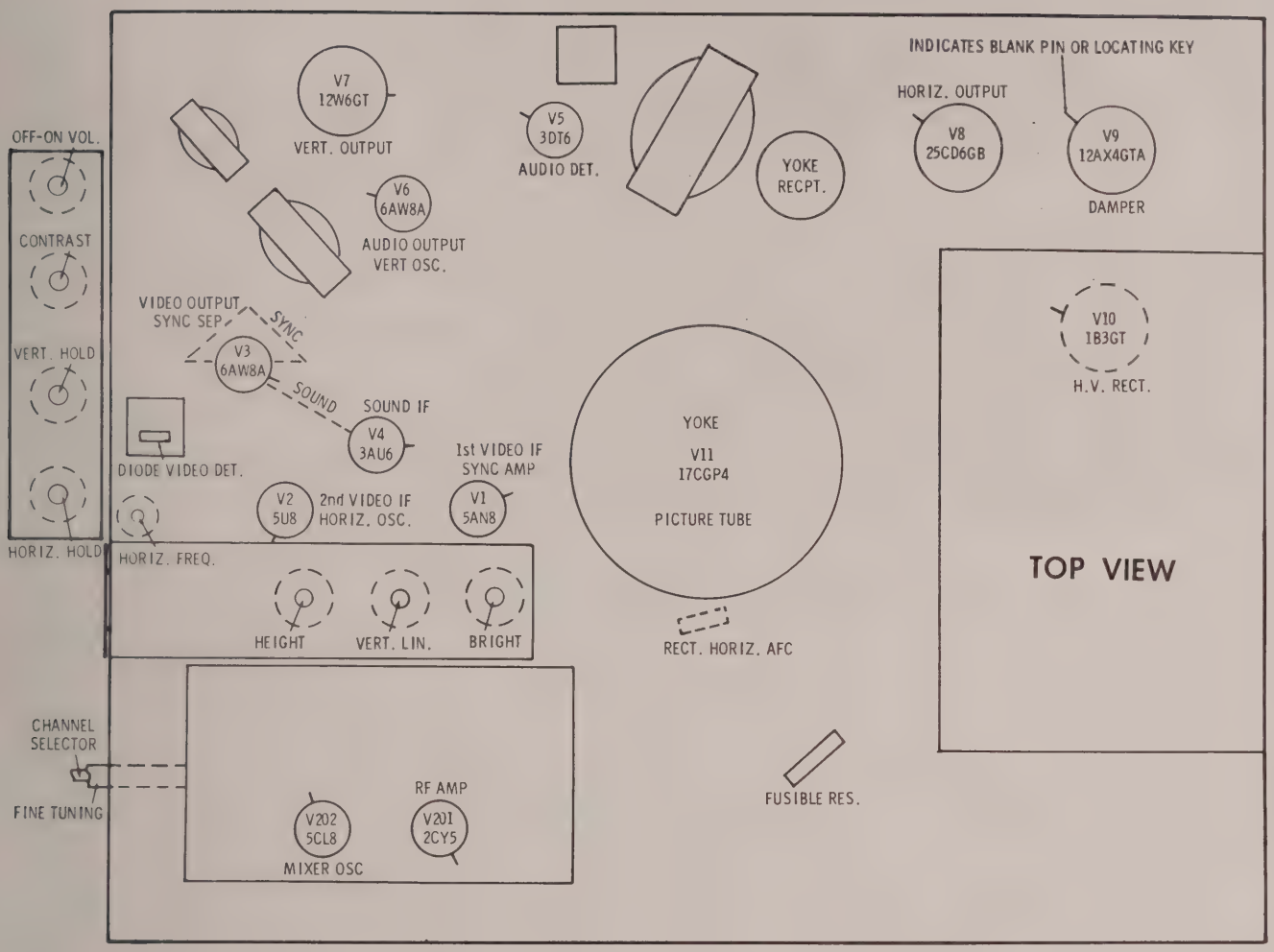
TUBE PLACEMENT CHART



TRAV-LER MODELS
1730, 1731 (Ch. 729-26, 775-57)

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

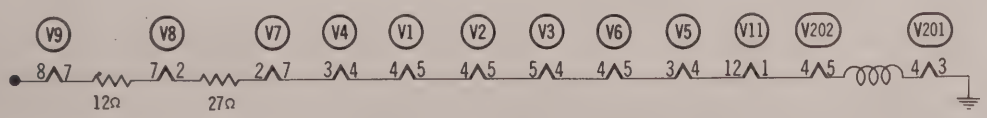
POWER SUPPLY FAILURE
No raster, no sound Fusible Resistor (R67), Rectifier (M1)

SWEEP FAILURE
No raster, has sound Rectifier (M2), V2, V8, V9, V10, V11
No vertical deflection V6, V7
Poor vert. linearity or foldover V6, V7
Poor horiz. linearity or foldover V2, V8, V9
Narrow picture V2, V8, V9, M1
Vert. off freq. V6
Horiz. off freq. V2

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, Diode (M3), V3
No pic, no sound, has snow V201, V202
No pic, has sound, has raster V3, V11
Has pic, no sound V4, V5, V6

SYNC FAILURE
No vert. sync V3, V1
No horiz. sync V3, V1, M2
No vert. or horiz. sync V3, V1

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



FOLDER 2

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Set Picture Contrast fully counterclockwise.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	44MC (10MC Swp)	41.25MC 42.25MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point (B). Low side to chassis. (Across Video Det. load)	Mixer Plate Coil, & A1, A2, A3, A4, A5	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. The Mixer Plate Coil and A3 affect low frequency side of curve, A1 and A2 affect high frequency side, A4 and A5 affect center range.

SOUND IF ALIGNMENT

Tune in a strong TV signal and adjust A6 for maximum undistorted sound. If two peaks occur, connect the DC probe of the VTVM to point (C) and common to chassis.
Adjust to the peak that produces the highest deflection on the VTVM.
Reduce the signal strength (by disconnecting the antenna or connecting an attenuator in series with the antenna) until noise is heard in the sound.
Adjust A7 and A8 for maximum undistorted sound.
Reduce the signal strength even further and retouch A7 and A8 for maximum undistorted sound.
If necessary, repeat above procedure.

4.5MC TRAP ALIGNMENT

Tune in a TV signal and adjust Fine Tuning until a 4.5MC beat pattern is visible in the picture. Adjust A9 until the horizontal scanning lines are smooth and continuous.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 6.

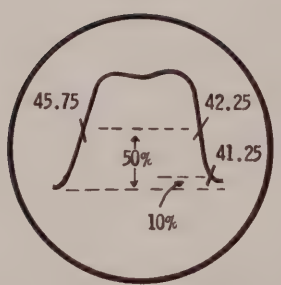
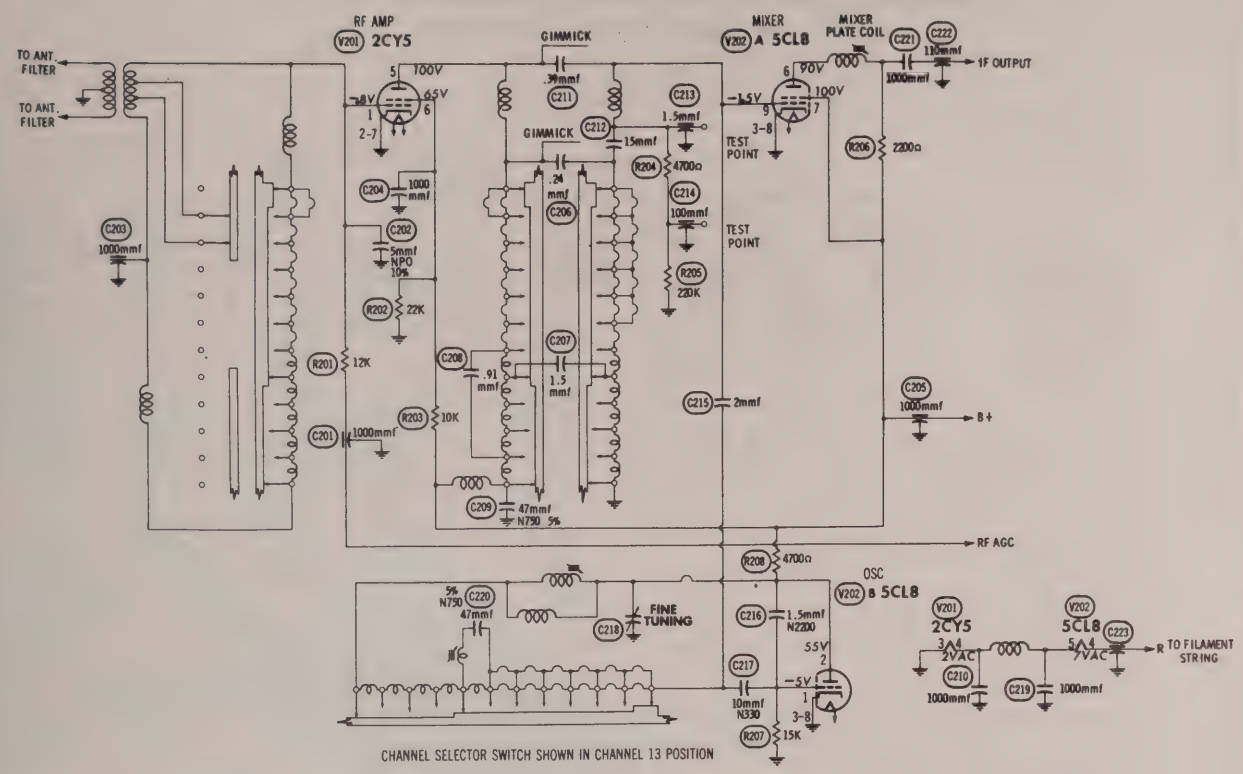


FIG. 1



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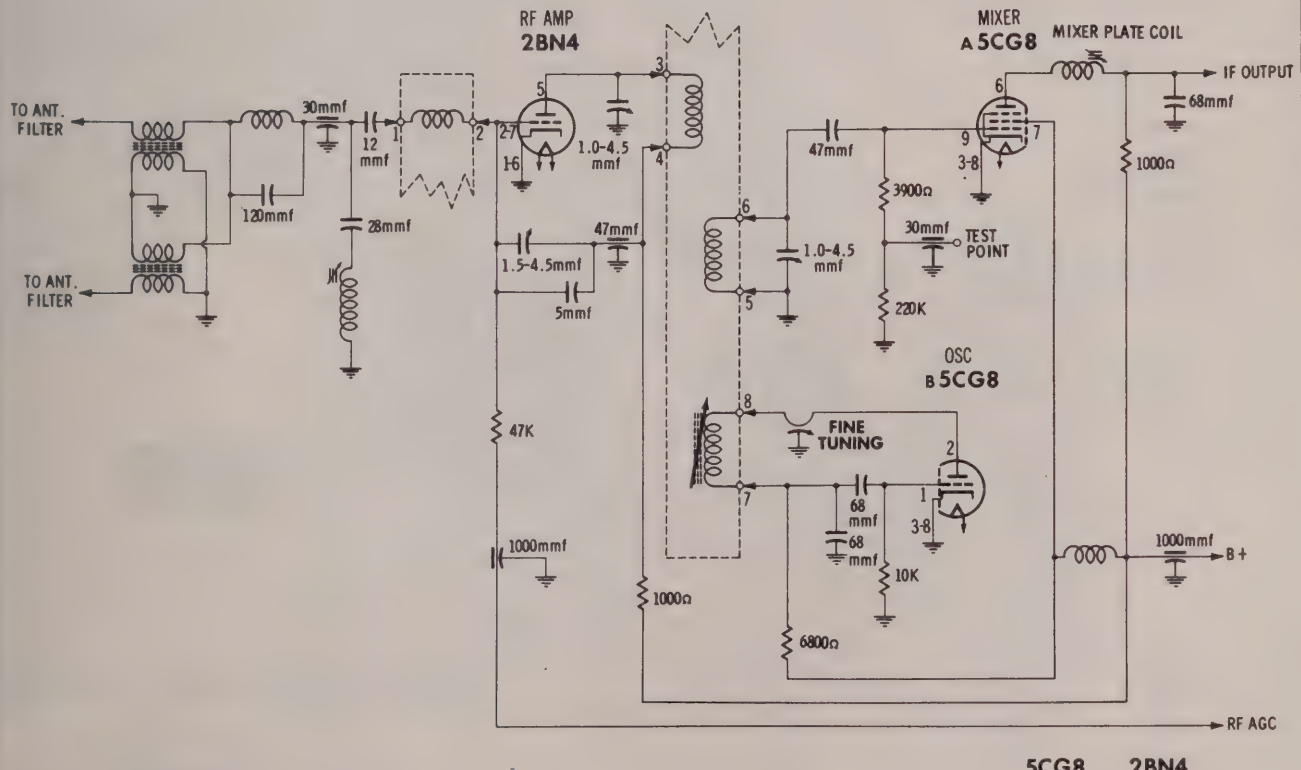
VHF TUNER #TA-75



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VHF TUNER #TA-29-1

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	2CY5	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	5CL8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	1000			EF-001	MFT-1000			503C-D1	
C202	5			NPO-DI 5	DTZ-4R7	C10V5C	ZT-555	5TCCB-V5	NPO 10%
C203	1000			EF-001	MFT-1000			503C-D1	
C204	1000			EF-001	MFT-1000			503C-D1	
C205	1000			EF-001	MFT-1000			503C-D1	
C206	.24								
C207	1.5			NPO-SI 1.5	TCZ-1R5	CTA6V15C	ZT-5515	5TCCB-V15	
C208	.91								
C209	47			N750-DI 47	DTN-47	C10Q47U		5TCU-Q47	N750 5%
C210	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C211	.39								
C212	15			BPD-000015	DD-150	L10Q15	UC-5415	5GA-Q15	
C213	1.5								
C214	100			EF-0001	MFT-100			503C-T1	
C215	2								
C216	1.5								N2200
C217	10								N330
C218									
C219	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C220	47				DTN-47				N750 5%
C221	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C222	110								
C223									

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R201	12K			
R202	22K			
R203	10K			
R204	4700Ω			

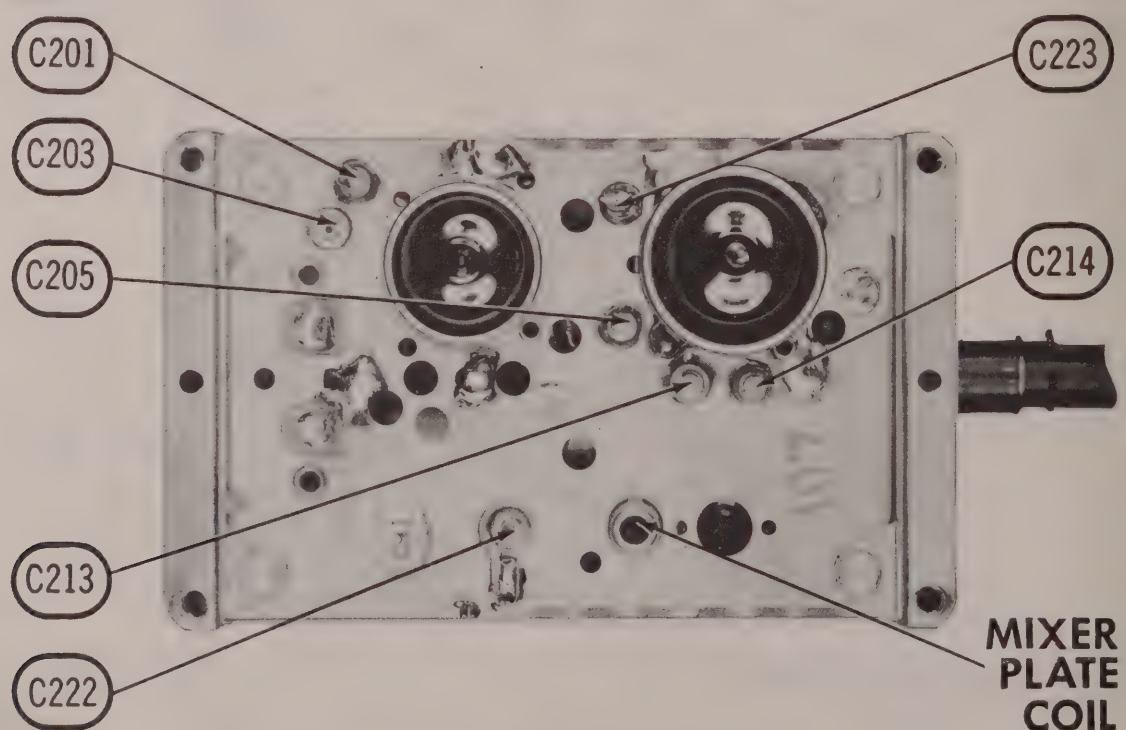
ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R205	220K			
R206	2200Ω			
R207	15K			
R208	4700Ω			

OSCILLATOR ALIGNMENT FOR TUNER #TA-75

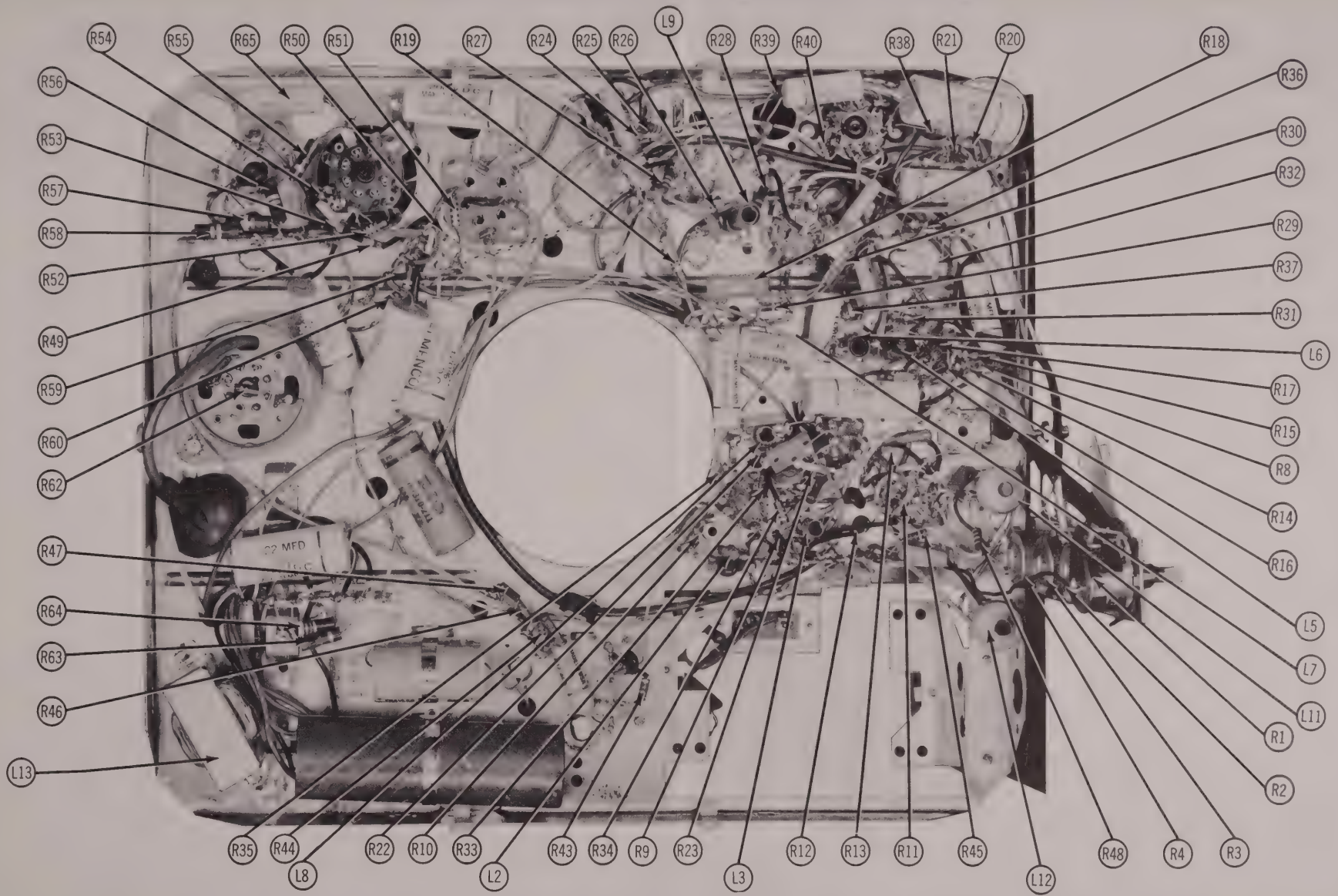
Set the Fine Tuning at the center of its range. One slug for HIGH band adjustment is located at 4 o'clock, and should be adjusted first. The LOW band adjustment is located at 9 o'clock. Adjust for best picture and sound.

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.



RF TUNER—TOP VIEW



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	1st Video IF Amp. - Sync Amp.	5AN8	
V2	2nd Video IF Amp. - Horiz. Osc.	5U8	
V3	Video Output-Sync Sep.	6AW8A	
V4	Sound IF Amp	3AU6	
V5	Audio Det.	3DT6	

ITEM No	USE	TYPE	NOTES
V6	Audio Output-Vert. Osc.	6AW8A	
V7	Vert. Output	12W6GT	
V8	Horiz. Output	25CD6GB	
V9	Damper	12AX4GTA	
V10	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA				NOTES
	TRAV-LER PART No	GENERAL ELECTRIC PART No	RCA PART No	SYLVANIA PART No.	
V11	17CGP4				

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						
	CAP	VOLT	TRAV-LER PART No	AEROVOX PART No.	CORNELL DUBILIER PART No	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	SPRAGUE PART No
C1A	250	150	EC-47A	PR3-012	XB0189	WT320	CDB-T-1015	Q-008	R2298 *
B	200	150							
C2A	50	150	EC-24A	PRSI50V5050	BBRD5515	TCD49	TDLD-9	MTD-1550	TVA-2453
B	50	150							
C3	200	25	EC-49	PRSI50V200	BR2502	WS342	TD-250-25	MTH-2535	TVA-1208

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No	SPRAGUE PART No	
C4	1500			BPD-0015	D6-152	LT6DX5	UC-5215	5GA-D15	
C5	.22	200		P288N-22		CUB2P22	GEM-2022	2TM-P22	
C6	1000			BPD-001	DD-102	BYA8DX	DC521	5HK-DX	
C7	1500			BPD-0015	DD-152	BYA10DX5	DC5215	5HK-DX5	
C8	1000			BPD-001	DD-102	BYA6DX	DC521	5HK-DX	
C9	1000			BPD-001	DD-102	BYA8DX	DC521	5HK-DX	①
C10	1500			SI 1500	D6-152	LT6DX5	UC-5215	5GA-D15	
C11	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C12	5000			BPD-005	DD-502	BYA10D6	DC525	5HK-D6	
C13	100			SI 100	D6-101	LT6T1	UC-531	5GA-T1	
C14	22			SI 22	D6-220	LT6Q22	UC-5422	5GA-Q22	
C15	.1	400		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C16	.1	400		P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C17	10			SI 10	D6-100	LT6Q	UC-541	5GA-Q1	
C18	68			1469-000068	D6-680	22R5Q68		MS-468	10%
C19	5000			BPD-005	DD-502	BYA10D6	DC525	5HK-D6	
C20	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C21	.02	200		P288N-02	DD-203	CUB2S2	GEM-412	2TM-S2	
C22	5000			BPD-005	DD-502	BYA10D6	DC525	5HK-D6	
C23	5000			BPD-005	DD-502	BYA10D6	DC525	5HK-D6	
C24	1000			BPD-001	DD-102	BYA6DX	DC521	5HK-DX	
C25	10000			BPD-01	DD-103	BYA8S1	DC511	5HK-S1	
C26	100			1469-0001	D6-101	5R5T1	MC3235	MS-31	10%
C27	4700			1464-0047		1R5D47		MS-247	10%
C28	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C29	680			1467-00068	D6-681	1W5T68		1FM-368	
C30	4700			1467-0047	D6-472	1W5D47		1FM-472	
C31	.22	600		P688N-22		CUB6P22	GEM-6022	6TM-P22	
C32	.02	600		P688N-02	DD-203	CUB6S2	GEM-612	6TM-S2	
C33	1000			BPD-001	DD-102	BYA6DX	DC521	5HK-DX	
C34	1500			SI 1500	D6-152	LT6DX5	UC-5215	5HK-DX5	
C35	.47	200	PC-32	P288N-47		CUB2P47	GEM-2047	2TM-P47	
C36	.022	400		P488N-022	DD-203	CUB4S22	GEM-4122	4TM-S22	
C37	270		MC-22	1469-00027	D6-271	5R5T27		MS-327	10%
C38	3900			1464-0039		1R5D39		MS-239	10%
C39	680			1464-00068	D6-681	1R5T68		MS-368	10%
C40	.22	600		P688N-22		CUB6P22	GEM-6022	6TM-P22	
C41	5000			BPD-005	DD-502	BYA10D6	DC525	5HK-D6	
C42	.22	200		P288N-22		CUB2P22	GEM-2022	2TM-P22	
C43	33	4000	CC-47						10%
C44	.22	200		P288N-22		CUB2P22	GEM-2022	2TM-P22	
C45	1000	2000		HVD-30-1000	DD30-102	HVB20D1	DC3021	20HKB-D1	
C46	.22	600		P688N-22		CUB2P22	GEM-6022	6TM-P22	
C47	56	2000			DD30-560				②
C48	47	1500	CC-27	HVD-30-47	DD30-470	HVA20Q47		20GAB-Q47	
C49	.22	600		P688N-22		CUB6P22	GEM-6022	6TM-P22	
C50	1500			SI 1500	D6-152	LT6DX5	UC-5215	5GA-D15	
C51	1500			SI 1500	D6-152	LT6DX5	UC-5215	5GA-D15	
C52	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C53	.01	600	PC-29	P688N-01	D6-103	CUB6S1	GEM-611	6TM-S1	
C54	10			N750-S1 10	TCN-10	CTA6Q1U	NT-541	5TCU-Q1	N750

① Not used in some versions.
② Some versions may use 47mmf ⑤ 1500V in this application (Part #CC-27).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRAV-LER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	VC-80	B-60	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req.	KSB-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	UB-26	
R2A	1000Ω	½	VC-83	B-505		B17-308	U3	Picture Contrast
B	Shaft			Not Req.		8 K1	Not Req.	
R3A	1.5meg	½	VC-81	B-742	A47-1.5meg-S	Q11-138	TA155L	Vert. Hold
B	Shaft			Not Req.	KSB-3	Not Req.	Not Req.	
R4A	50K	½	VC-83	B-31	A47-50K-S	Q11-133	TA54L	Horiz. Hold
B	Shaft			Not Req.	KSB-3	Not Req.	Not Req.	
R5A	100K	½	VC-84	AB-40	A47-100K-S	Q11-136	PTA1SL	Brightness
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R6A	750Ω	½	VC-77	AB-5	A47-750-S	Q11-105	PTA75LX	Vert. Lin.
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R7A	2.5meg	½	VC-78	AB-33	A47-2.5meg-S	Q11-139	SU-565	Vert. Size
B	Shaft			AK-19	RN-3	TQ	Not Req.	

* Use KR-1 on CRL "red label" and KB-1 on "blue label" controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R8	1meg			
R9	150Ω			
R10	47Ω			
R11	33K			
R12	470Ω			
R13	180Ω			
R14	6800Ω			
R15	2.9meg			
R16	1meg			
R17	68K			
R18	6800Ω	5	WR-8	
R19	220K			
R20	2200Ω			
R21	4700Ω			
R22	4700Ω			
R23	680Ω			
R24	560K			
R25	470Ω			
R26	680Ω			
R27	270K			
R28	220Ω			
R29	10K 5%			
R30	330K			
R31	2.2meg			
R32	150K			
R33	22K			
R34	560K			
R35	4700Ω			
R36	4700Ω			
R37	1meg 5%			
R38	1meg			

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R39	47K	1		
R40	220Ω			
R41	560Ω			
R42	560Ω			
R43	6800Ω			
R44	120K			
R45	110K 5%		IR-147	
R46	58K 5%			
R47	10K 5%			
R48	47K			
R49	100K			
R50	100K			
R51	47K			
R52	180K			
R53	680K			
R54	47Ω			
R55	1000Ω	1		
R56	150K	1		
R57	150K	1		
R58	150K	1		
R59	220K			
R60	220K			
R61	15Ω			
R62	2.2Ω			
R63	1000Ω	1		
R64	470Ω	1		
R65	12Ω	10	WR-34	
R66	28Ω	10	WR-36	
R67	5Ω			
R68	470K			
R69	220K			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		TRAV-LER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Rom PART No.	
L1	1st. Video IF	L-83	17-4534	TV-131		VF-4	
L2	RF Choke	L-86	19-6022 *	TV-192 *	6152 *		22 Microhenries, wound on 4700Ω resistor
L3	2nd. Video IF	L-83					
L4A	3rd. Video IF						
B	RF Choke						17 Microhenries
L5	Series Peaking Coil	L-86A	19-3500 ■	TV-188 ■	6138 ■	VP-8 ■	478 Microhenries, wound on 12K resistor
L6	4.5MC Trap	L-89	20-1004	TV-151	1469 ▲	SF-3	
L7	Shunt Peaking Coil	L-88	19-5100 ▲		6157 ▪		1075 Microhenries, wound on 4700Ω resistor
L8	1st. Sound IF	L-90	17-3400	TV-151	1469 ▲	SF-3	
L9	2nd. Sound IF	L-80A			TV-149		
L10	Quadrature Coil	L-110			1481 *	SD-5 *	Includes cap. & resistor, Ch. 775-57
	Quadrature Coil	L-79	20-1005	TV-121	1480		Ch. 729-26

* Parallel with 4700Ω resistor.
■ Parallel with 12K resistor.
▲ Disregard tap.
▲ Parallel with 8200Ω resistor.
* Parallel with 180K resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES		REPLACEMENT DATA						NOTES
	PRI	SEC.	TRAV-LER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Rom PART No.	Thordarson PART No.	
L11	140Ω *		L-93A						Horiz. Freq. * Tapped ② 102Ω Horiz. Waveform
L12	148Ω		L-92A						

FILTER CHOKE

ITEM No	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE @ CURRENT 1000 ~(.)	TRAV-LER PART No	Holldorson PART No.	Merit PART No.	Rom PART No.	Stancor PART No	Thordarson PART No.	Triad PART No
L13	.210A	49Ω	1 Hy.	FC-5	C-5037①	C-2974 ①	F-803 ①	C-2326①	26C41	C-24X

① Drill new mounting hole.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							NOTES
		TRAV-LER PART No.	Holldorson PART No.	Merit PART No.	Rom PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No	
T1	Vert. Osc.	TR-23	B6702 ①	A-3003 ①	V406 ①	A-8125 ①	26A03	A-97Z	
T2	Vert. Output	TR-21	Z1900 ②	A-2822 ③	V314 ③	A-8147 ④	26S71 ⑤	A-108X ⑥	
T3 A	Yoke-Horiz. (30MH)	L-71A	DF-605	MDF-73	Y70F20/43	DY-11A	Y-10	Y-22 &	
B	(70Ω)-Vert. (38MH)		5⑥7	5.7	⑤⑥⑦	⑤⑦	5 ⑦	NW2 5	
	Rear Cover & Centering Device	MP-77						YC-1 & CL-1	
T4	Horiz. Output	TR-28							

① Drill new mounting hole(s).
② Use 6 to 1 turns ratio.
③ Disconnect pin #2 of yoke socket from ground. Connect blue lead to plate. Connect red lead to pin #3 of yoke socket and pin #4 of V7. Connect green lead to pin #3 of yoke socket.
④ Disconnect pin #2 of yoke socket from ground. Connect blue lead to plate. Connect red lead to pin #2 of yoke socket and pin #4 of V7. Connect black lead to pin #3 of yoke socket.
⑤ Use original rear cover and centering device. Connect same as original.
⑥ Connect horizontal damping capacitor across yoke terminals #1 and #2.
⑦ Use original yoke damping network, if necessary.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI	SEC	TRAV-LER PART No	Holldorson PART No.	Merit PART No	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T5	16K	3-4Ω	AT-18	Z1118	A-2934	AU-608	A-3881	34S54	S-51X

SPEAKER

ITEM No.	TYPE				REPLACEMENT DATA		NOTES
	SIZE	FIELD	V C	IMP	TRAV-LER PART No.	QUAM PART No.	
SP1	4"	PM		3-4Ω	SPK-49	4A07	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	TRAV-LER PART No	REPLACEMENT DATA	
K1	Antenna Isolation	470mmf, .3-1meg	CC-55	Centralab	RC-471
				Sprague	ACI-1
K2	Antenna Isolation	470mmf, .3-1meg	CC-55	Centralab	RC-471
				Sprague	ACI-1
K3	Vert. Integrator	2000mmf, 5000mmf, 5000mmf, 22K, 82000, 82000	CC-26	Aerovox	PA-110
				Centralab	PC-104
				Cornell-Dubilier	115TMI
				Sprague	V-1

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	TRAV-LER PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.240A	SR-8 ①	124JAH	1N1007 ③	T350 1	350A 1	① Selenium Type.
					TV500 3	M500 3	② Germanium Type.
M2		SR-10 1	K1616		1T1 ①		③ Silicon Type.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		TRAV-LER PART No.	CBS PART No.	SYLVANIA PART No.	
M3	1N60	SC-1	1N60	1N295	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	TRAV-LER PART No.	NOTES
M4	Tuner	TA-75	VHF Ch. 775-57
	Tuner	TA-29-1	VHF Ch. 729-26

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

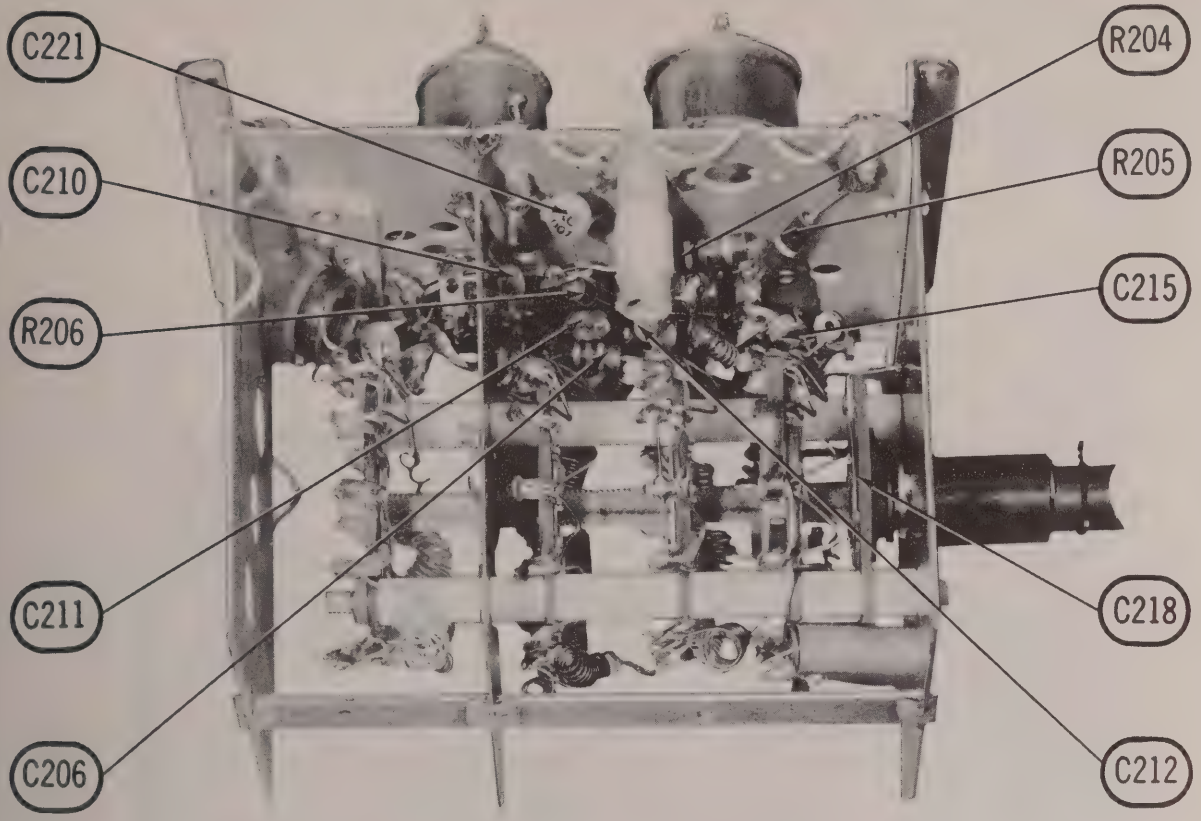
NAME	PART NO.	DESCRIPTION
Safety Glass	DW-65	
Knob	K-200	Channel Selector
Knob	K-201	Fine tuning
Knob	K-202	4 used, Model 1730
Knob	K-246	4 used, Model 1731

WIRING DATA

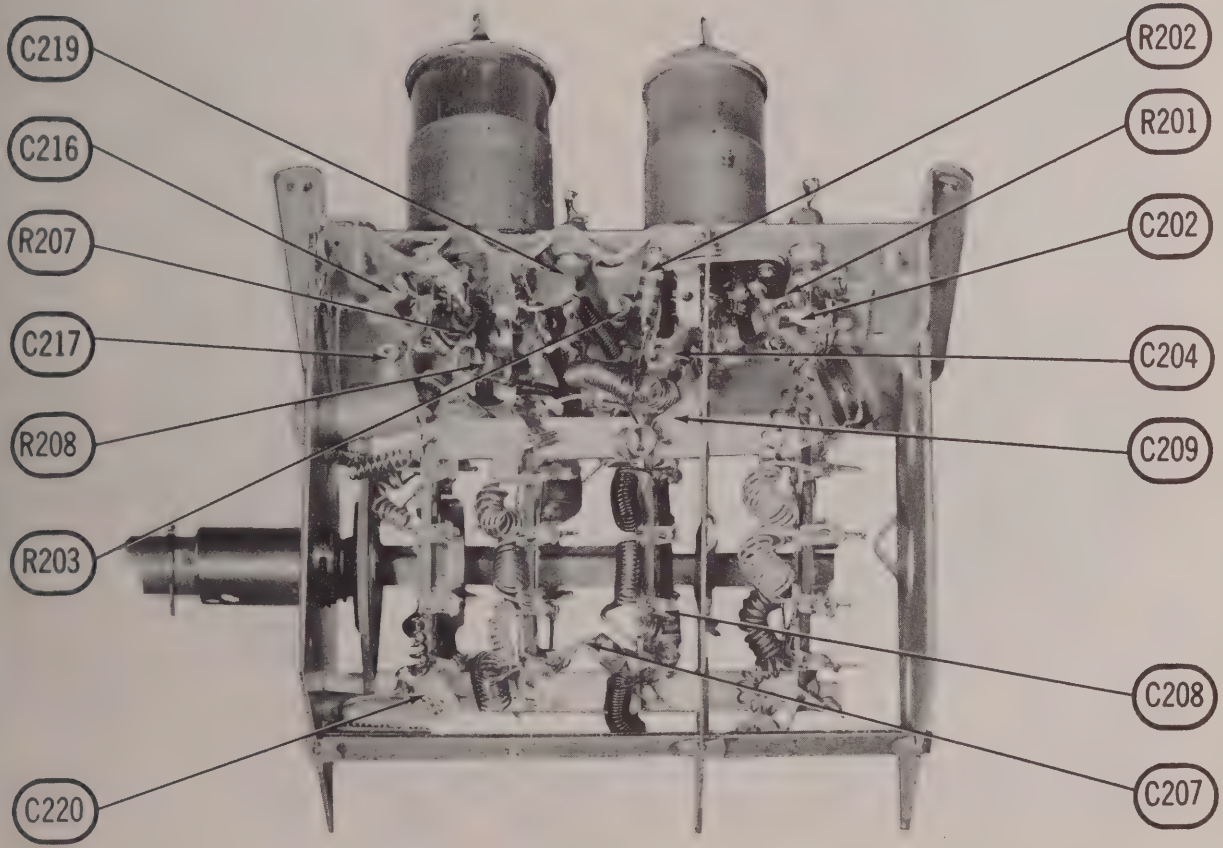
High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8867
300Ω Tuner Input Lead	Use BELDEN No. 8230
300Ω Antenna Lead-In	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

TRAV-LER MODELS 1730, 1731 (Ch. 729-26, 775-57)

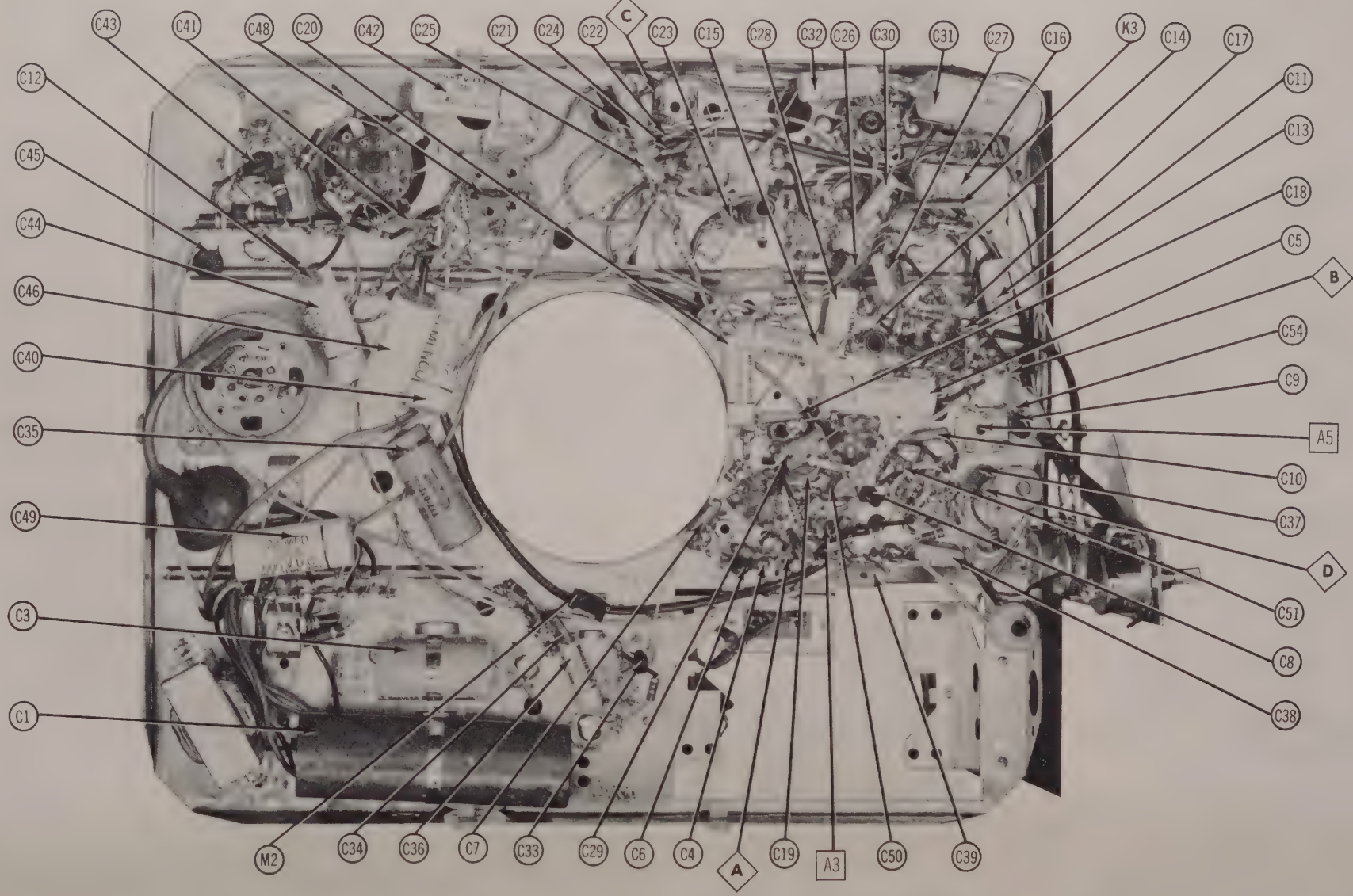
FOLDER 2



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE



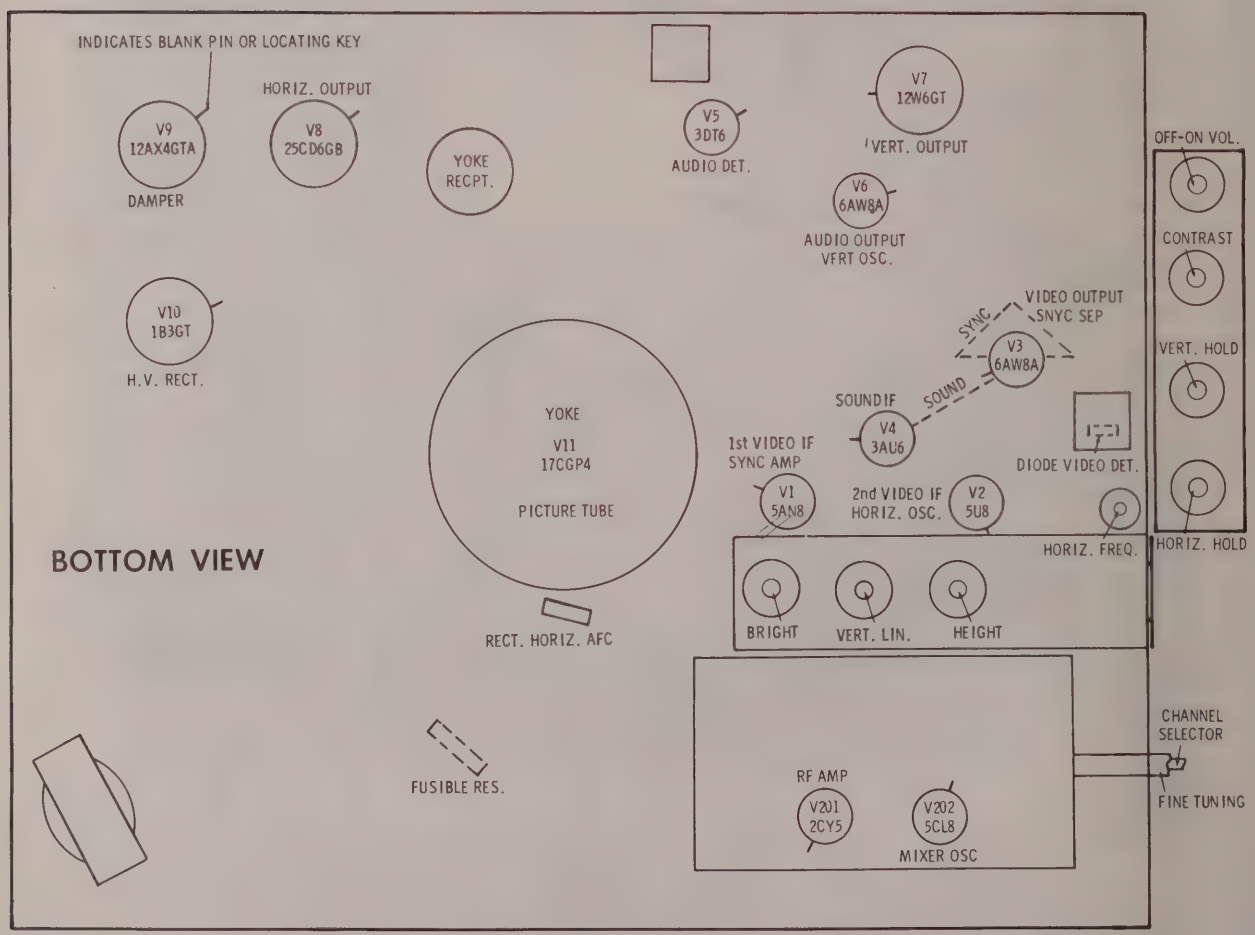
CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

CHASSIS-TOP VIEW

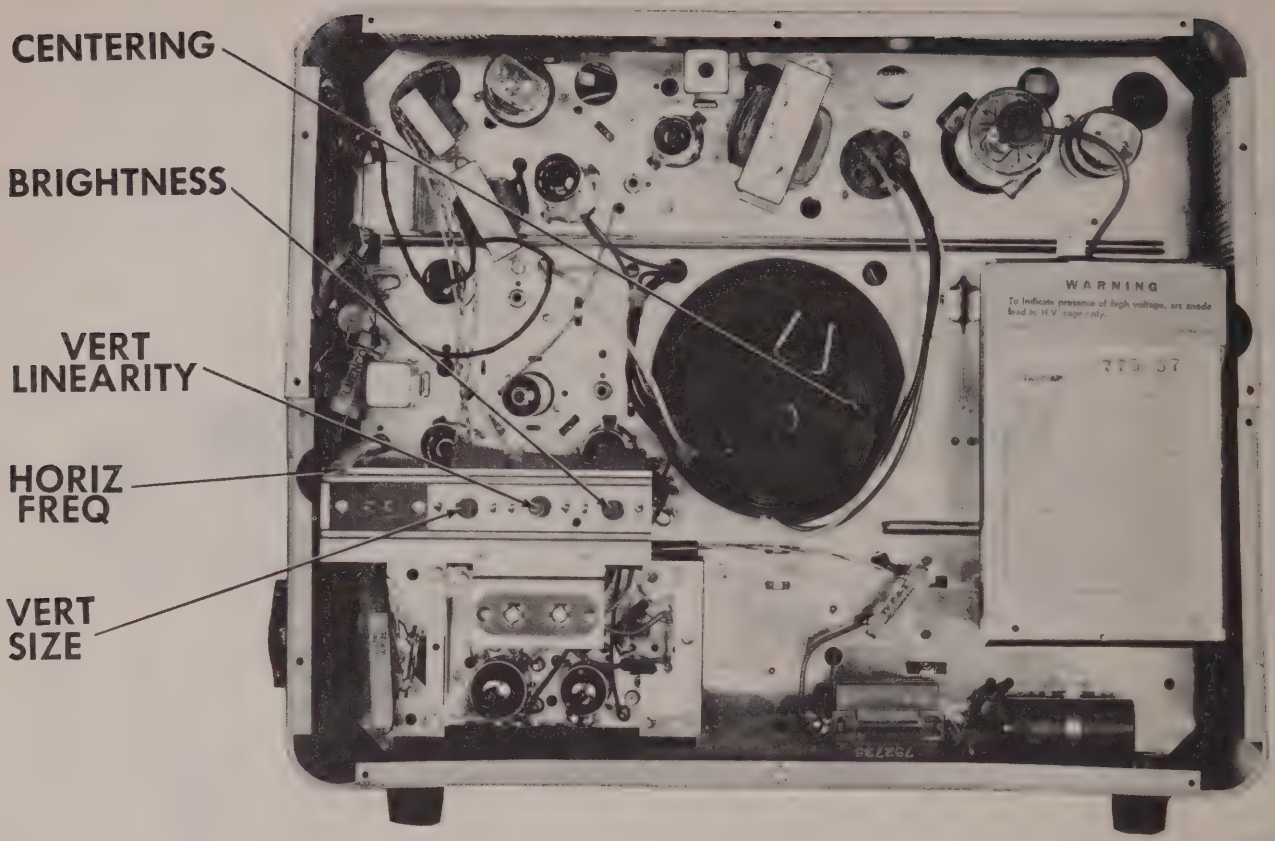
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	5AN8	†9500Ω	22K	0Ω	10Ω	8.5Ω	†630Ω	†630Ω	1meg	47Ω
V2	5U8	†100K	.1Ω	†950Ω	8.5Ω	7.5Ω	†950Ω	180Ω	0Ω	190K
V3	6AW8A	0Ω	2.2meg	†150K	6Ω	7.5Ω	•180Ω	750K	†470Ω	†6800Ω
V4	3AU6	1Ω	0Ω	10.5Ω	10Ω	†55Ω	†520Ω	560Ω		
V5	3DT6	5.3Ω	680Ω	4.5Ω	3.5Ω	†270K	†950Ω	560K		
V6	6AW8A	0Ω	•1.4meg	‡2.3meg	6Ω	4.5Ω	220Ω	0Ω	†520Ω	†1600Ω
V7	12W6GT	TP	13Ω	†245Ω	†49Ω	1meg	TP	10.5Ω	• 370Ω	
V8	25CD6GB	NC	39Ω	0Ω	TP	180K	NC	42Ω	†1000Ω	TOP CAP ‡17Ω
V9	12AX4GTA	NC	NC	¶250K	NC	†49Ω	NC	54Ω	57Ω	
V10	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡860Ω
V11	17CGP4	2Ω	2200Ω	Pin 6 ‡23Ω	Pin 10 13Ω	Pin 11 • 240K	Pin 12 3.5Ω			
V201	2CY5	1meg	0Ω	0Ω	.5Ω	†470Ω	†7000Ω	0Ω		
V202	5CL8	15K	†5100Ω	0Ω	2Ω	.5Ω	†2200Ω	†470Ω	0Ω	225K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC
• CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 140V SOURCE.
‡ MEASURED FROM PIN 3 OF V9.
NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Adjust for normal picture and sound. Set the Horizontal Hold at the center of its range.

Adjust Horizontal Frequency slug (B1) until the picture synchronizes horizontally.

Connect the vertical amplifier of a scope thru a 10mmf capacitor to point ◇D◇. Low side to chassis.

Adjust Horizontal Waveform slug (B2) for waveform similar to Fig. 2 with the narrow peaks 5% higher than broad. While making this adjustment, keep picture synchronized horizontally with B1.

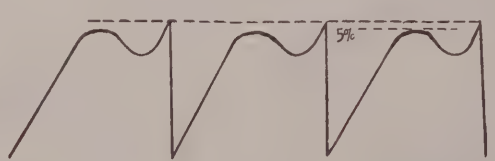


FIG. 2

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type knobs from the front. Remove 2 wood screws holding the knob escutcheon. Remove the escutcheon and 4 remaining knobs.

2. Remove 6 wood screws from the rear cover. Remove the rear cover.

3. Loosen 2 wood screws and remove the antenna terminal board.

4. Remove 2 wood screws from the top chassis braces.

5. Remove 4 chassis bolts from the bottom.

6. Remove the speaker leads.

7. Remove the chassis.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Wells-Gardner	MODELS	321N73-A-3701, 321N73-A-3750, 321N73-A-3762, 321N73-A-3791, 2321N73-A-3703, 2321N73-A-3752, 2321N73-A-3763, 2321N73-A-3793, 3321N73-A-3798
MANUFACTURER	Wells-Gardner Co., 2701 N. Kildare Avenue, Chicago 39, Illinois		
TYPE SET	Television Receiver		
TUBES	Fifteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING	1.3 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. The adjustments are accessible, one at a time, as the channel selector is rotated. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 5 wood screws from the trim at the top edge of the safety glass. Tilt glass out at the top and lift up to remove.

SPECIAL ADJUSTMENTS

A. Range
Turn range control fully counter clockwise, then clockwise for best picture and MINIMUM snow without distortion or overload.

B. Focus
Adjust the beam alignment magnet on the neck of the picture tube for best focus.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Set the horizontal hold at the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart).

FUSE DEVICE

A circuit breaker is used for LV power supply protection and may be reset by depressing the reset button.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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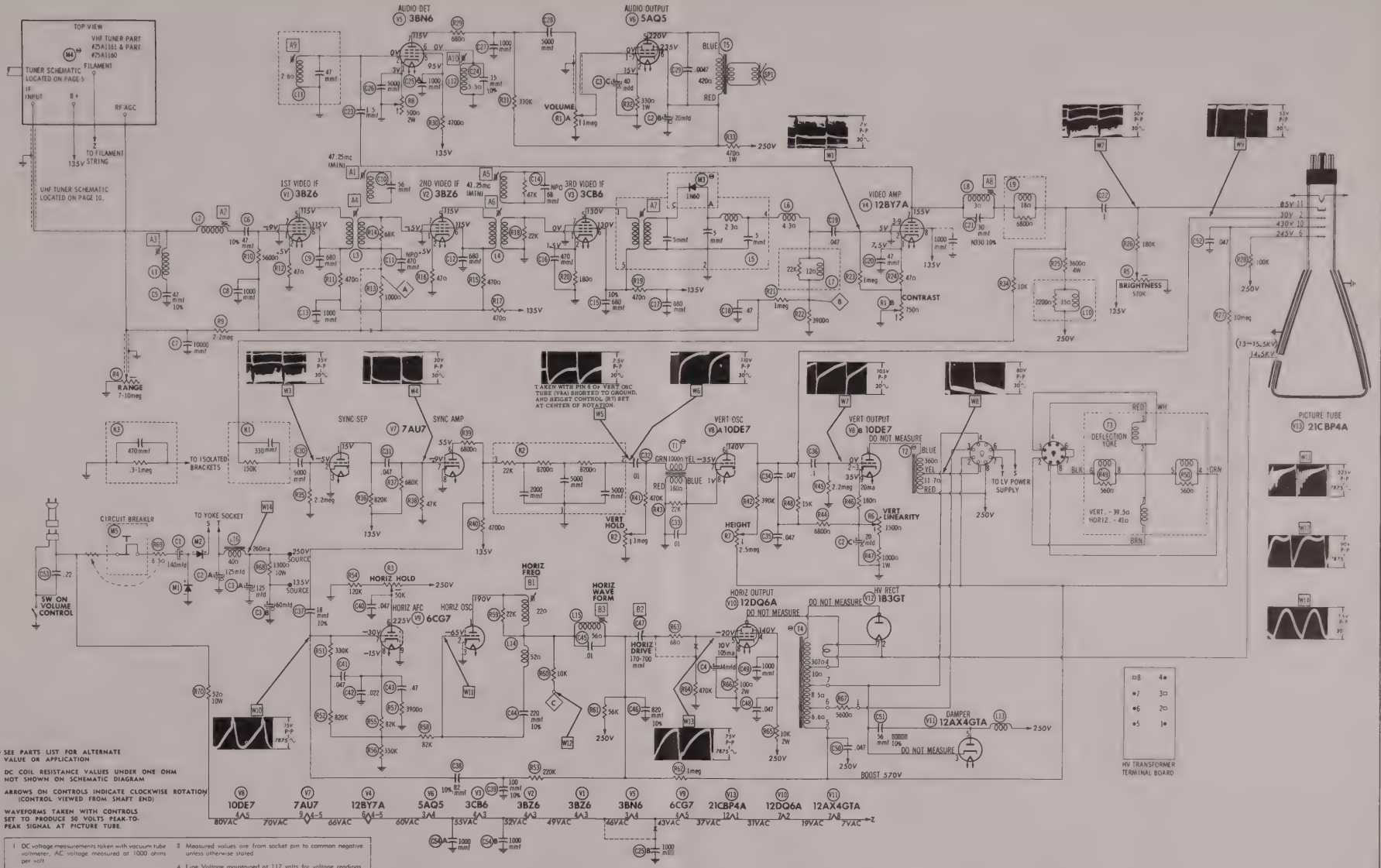
H414R

WELLS-GARDNER MODELS 321N73-A-3701, 321N73-A-3750, 321N73-A-3762, 321N73-A-3791, 2321N73-A-3703, 2321N73-A-3752, 2321N73-A-3763, 2321N73-3793, 3321N73-A-3798

SET 413 FOLDER 3



SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1000 ohms per volt
2. Pin numbers are counted in clockwise direction on bottom of socket
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line Voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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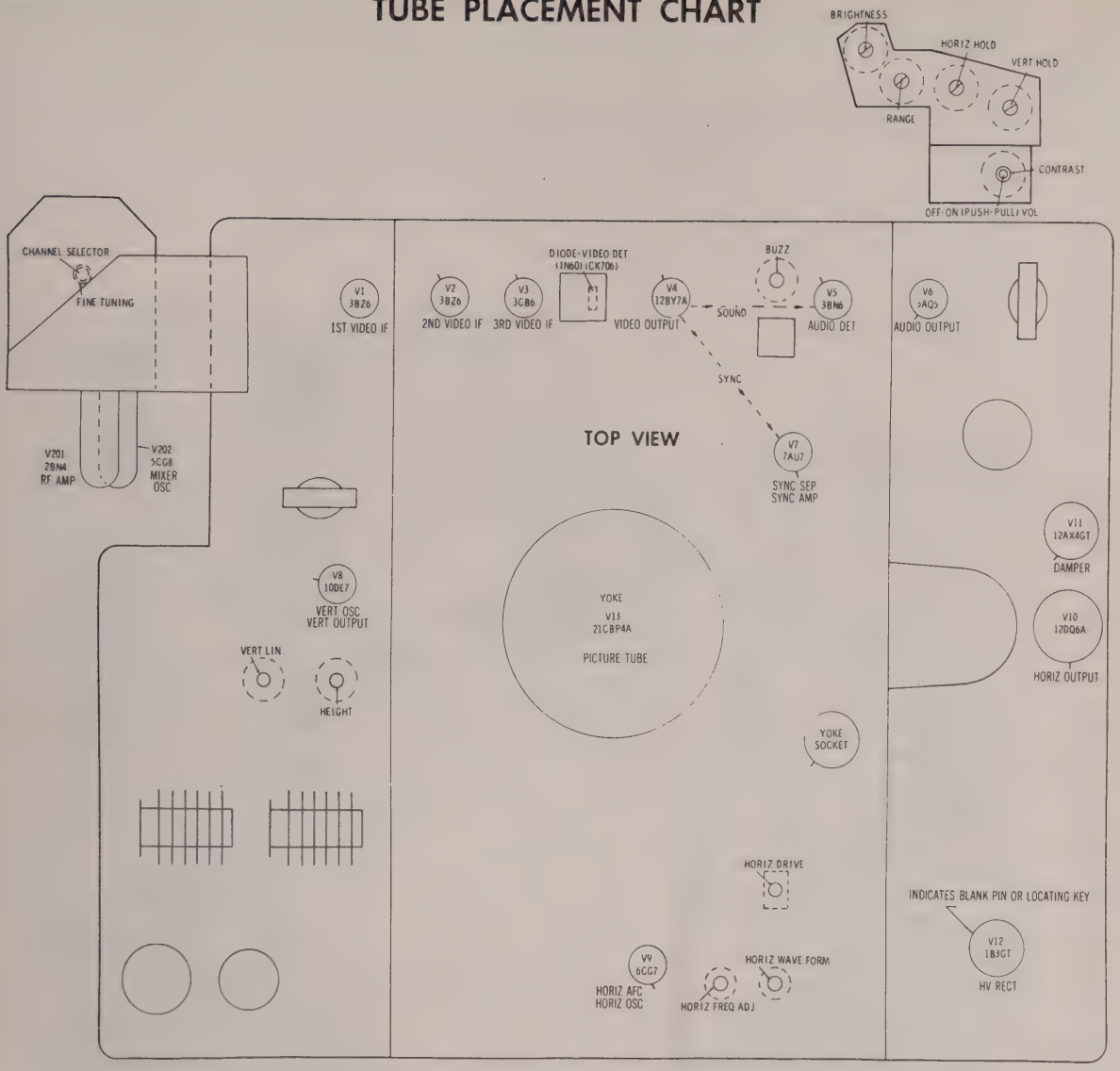
WELLS-GARDNER MODELS 321N73-A-3701, 321N73-A-3750, 321N73-A-3762, 321N73-A-3791, 321N73-A-3703, 2321N73-A-3752, 2321N73-A-3763, 2321N73-A-3793, 3321N73-A-3798

FOLDER 3

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

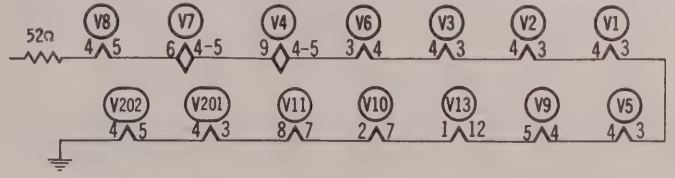
POWER SUPPLY FAILURE
No raster, no sound - **Circuit Breaker (M5), Rectifier (M1, M2)**

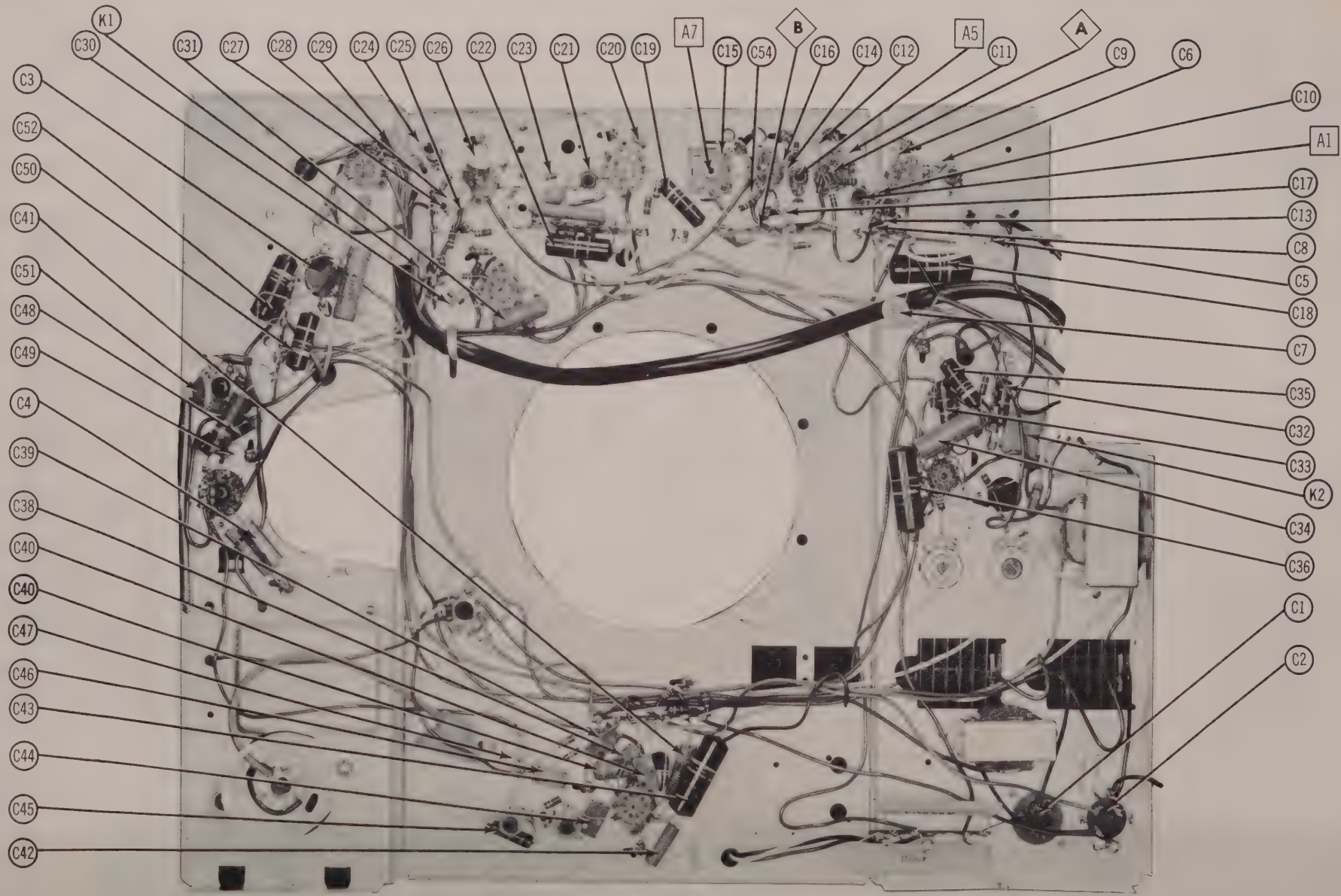
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V1, V2, V3, Diode (M3), V4**
No pic, no sound, has snow - **V201, V202, V1**
No pic, has sound, has raster - **V4, V13**
Has pic, no sound - **V5, V6**

SYNC FAILURE
No vert. sync - **V7**
No horiz. sync - **V7, V9**
No vert. or horiz. sync - **V7**

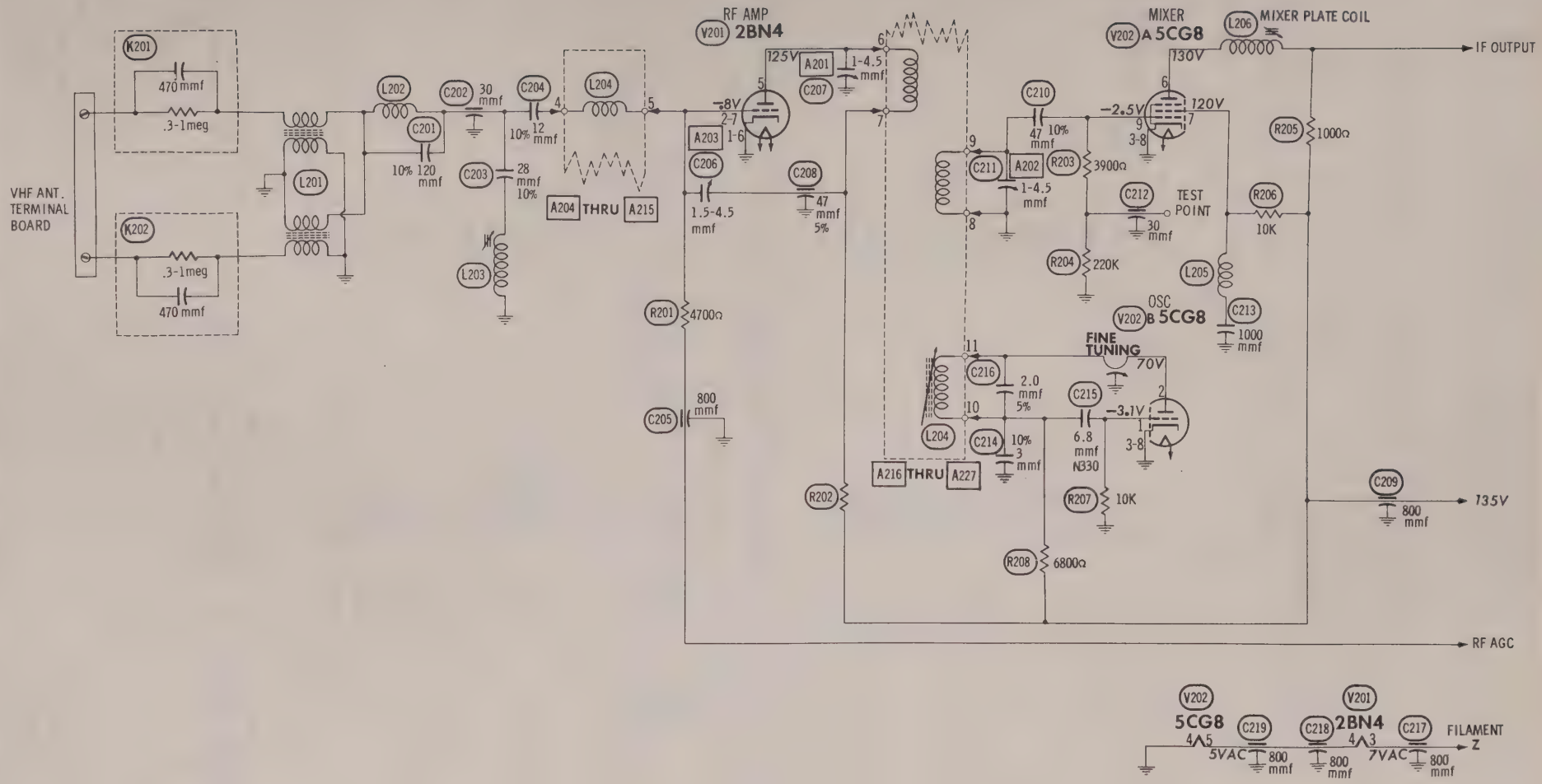
SWEEP FAILURE
No raster, has sound - **V9, V10, V11, V12, V13**
No vertical deflection - **V8**
Poor vert. linearity or foldover - **V8**
Poor horiz. linearity or foldover - **V9, V10, V11**
Narrow picture - **V9, V10, V11, M1, M2**
Vert. off freq. - **V8**
Horiz. off freq. - **V9**

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below).





CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



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VHF TUNER #25A1161, 25A1160

WELLS-GARDNER MODELS 321N73-A-3701, 321N73-A-3750, 321N73-A-3762, 321N73-A-3791, 321N73-A-3703, 321N73-A-3752, 232IN73-A-3763, 232IN73-A-3793, 332IN73-A-3798

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
Allow a 20 minute warm-up period for the receiver and test equipment.

RF AND MIXER ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to point Ⓣ. Positive to chassis.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading. (Approximately 1.5 volts).
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC	193.25MC 197.75MC	10	Vert. Amp. thru 10K to point Ⓤ. Low side to chassis.	A201, A202	Adjust A201 and A202 for maximum amplitude and symmetry with markers as shown in Fig. 201.
2.	"	"	"	"	"	Vert. Amp. thru detector (Fig. 202). to plate of 1st. IF tube. Low side to chassis.	A203	Adjust A203 to obtain MINIMUM response on the scope.
3.	"	"	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point Ⓤ. Low side to chassis.	A204	Adjust for maximum amplitude of response similar to Fig. 201. Adjust by expanding or compressing coil turns.
			207MC	205.25MC 209.75MC	12		A205	
			201MC	199.25MC 203.75MC	11		A206	
			195MC	193.25MC 197.75MC	10		A207	
			189MC	187.25MC 191.75MC	9		A208	
			183MC	181.25MC 185.75MC	8		A209	
			177MC	175.25MC 179.75MC	7		A210	
			85MC	83.25MC 87.75MC	6		A211	
			79MC	77.25MC 81.75MC	5		A212	
			69MC	67.25MC 71.75MC	4		A213	
			63MC	61.25MC 65.75MC	3		A214	
			57MC	55.25MC 59.75MC	2		A215	

OSCILLATOR ALIGNMENT

Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading. (Approximately 1.5 volts).
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across video detector load.	A216	Adjust to place sound marker in trap notch as in Fig. 203. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A217	
			201MC	199.25MC 203.75 MC	11		A218	
			195MC	193.25MC 197.75MC	10		A219	
			189MC	187.25MC 191.75MC	9		A220	
			183MC	181.25MC 185.75MC	8		A221	
			177MC	175.25MC 179.75MC	7		A222	
			85MC	83.25MC 87.75MC	6		A223	
			79MC	77.25MC 81.75MC	5		A224	
			69MC	67.25MC 71.75MC	4		A225	
			63MC	61.25MC 65.75MC	3		A226	
			57MC	55.25MC 59.75MC	2		A227	

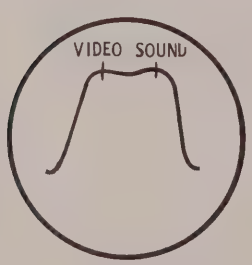


FIG.201

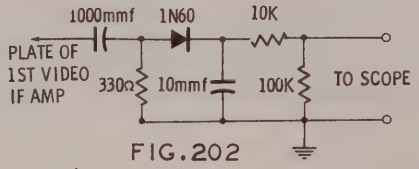


FIG.202

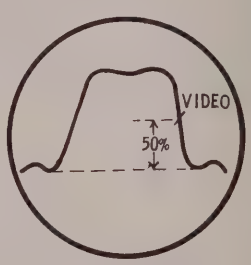


FIG.203

PRE-ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 1.5 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer-osc. tube (V202). Low side to chassis.	44.5MC (10MC Swp)	47.25MC	Any non-interfering channel	Vert. Amp. thru detector (Fig.1) to pin 5 (plate) of 3BZ6 (V1). Low side to chassis.	A1	Adjust to place marker in trap notch as in Fig. 2.
2.	"	"	"	41.25MC	"	"	Mixer Plate Coil & A2, A3	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. The mixer plate coil and A2 shape the top of response. A3 places 41.25MC marker. A3 must be adjusted accurately or sound rejection will not be correct. The 45.75MC marker must be placed exactly on peak or the 44.5MC marker will not be correct in following steps.
3.	"	"	"	42.8MC	"	Vert. Amp. thru 10K to point (B). Low side to chassis. DC probe of VTVM to point (B). Common to chassis. (Across video det. load).	A4	Adjust sweep output for -2 volts on VTVM. Adjust A4 for maximum gain at marker.
4.	"	"	"	41.25MC	"	"	A5	Adjust for MINIMUM gain at marker.
5.	"	"	"	45.3MC	"	"	A6	Adjust for maximum gain at marker.
6.	"	"	"	44.0MC	"	"	A7	"
7.	"	"	"	41.25MC 42.4MC 42.8MC 44.0MC 44.3MC 44.5MC 45.75MC 47.25MC	"	"		Check for response similar to Fig. 3 with markers as shown. The 44.5MC is critical so if necessary, retouch A7 to place 44.5MC marker at 98%. If necessary, retouch A6 for correct position of 45.75MC marker and A4 to position 42.8MC marker. (A4 seldom needs retouching). DO NOT retouch mixer plate coil or A2.

4.5MC TRAP ALIGNMENT

Use 0-10 volt AC scale on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.001mfd	High side to point (B). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	AC probe to pin 11 (cathode) of picture tube. Common to chassis.	A8	Adjust for MINIMUM deflection. This adjustment can be made while observing a picture from a station. Adjust for MINIMUM beat (grain) interference in picture.

SOUND IF ALIGNMENT

Tune in a TV station and reduce the signal strength by use of an attenuator or similar device until a hiss similar to super regenerator is heard in the sound.
Adjust A9, A10 and the buzz control (R8) for maximum undistorted sound with MINIMUM buzz.
If the hiss disappears during alignment, further reduce the signal strength until the hiss returns.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 6.

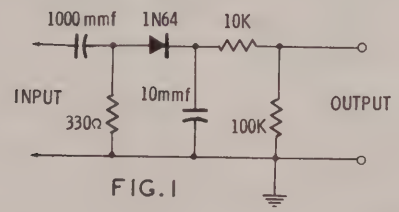


FIG. 1

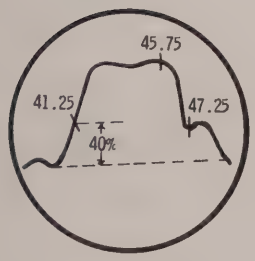


FIG. 2

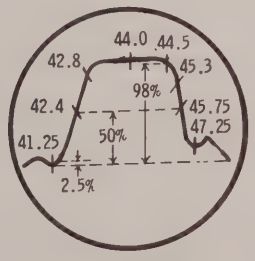


FIG. 3

WELLS-GARDNER MODELS 321N73-A-3701, 321N73-A-3750, 321N73-A-3762, 321N73-A-3791, 2321N73-A-3703, 2321N73-A-3752, 2321N73-A-3763, 2321N73-A-3793, 3321N73-A-3798

FOLDER 3

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	1st. Video IF Amp.	3BZ6	
V2	2nd. Video IF Amp.	3BZ6	
V3	3rd. Video IF Amp.	3CB6	
V4	Video Output	12BY7A	
V5	Audio Det.	3BN6	
V6	Audio Output	5AQ5	
V7	Sync Sep. -Sync Amp.	7AU7	
V8	Vert. Osc. - Vert. Output	10DE7	
V9	Horiz. AFC-Horiz. Osc.	6CG7	
V10	Horiz. Output	14D6A	
V11	Damper	12AX4GTA	
V12	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No	Wells-Gardner PART No	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	RCA PART No.	SYLVANIA PART No.	NOTES
V13	21CBP4A		21CBP4-A ①	21CBP4/21CBP4A ②	① "Silverama" ③ ② "Silver screen 85"

ELECTROLYTIC CAPACITORS

ITEM No	RATING CAP.	RATING VOLT	Wells-Gardner PART No	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	140	150	45X421	AFH31-23	XA0261	FP117	TMS-24	T-055	TVL-1428
C2A	±125	300	45X431	AFH4-02-60	XC0733.2	FP218		Q-017	*52376
B	±20	300				TC36		MT-0525	
C	±20	50							
C3A	±125	300	45X420	AFH3-99-82	C0733.7	FP420.76		T-115	TVL-3574.6
B	±60	300				TC65		MT-0550	
C	±40	50							
C4	4	50	45X418	PRS150V4	BBR4-50	TC30	ML5-50	MT-0504	TE-1303

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	47			NPO-DI 47	D6-470	L10Q47	ED-47		MS-447	10%
C6	47			NPO-DI 47	D6-470	L10Q47	ED-47		MS-447	10%
C7	10000			BPD-01	DD-103	BYA8G1	ED-01	DC511	5HK-S1	
C8	1000			BPD-001	DD-102	BYA8I2	ED-1000	DC521	5HK-D1	
C9	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C10	68			NPO-DI 56	TCZ-56	L10Q56	TCO-56			NPO
C11	470			BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C12	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C13	1000			BPD-001	DD-102	BYA8I2	ED-1000	DC521	5HK-D1	
C14	68			NPO-DI 56	TCZ-68	C10Q68C	TCO-68		5TCC-Q68	NPO
C15	680				D6-681	1R5T68	ED-680	UC-5368	MS-368	10%
C16	470			BPD-00047	DD-471	BYA10T47	ED-470	UC-5347	5GA-T47	
C17	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C18	.47	200		P288N-47		CUB2P47		GEM-2047	2TM-P47	
C19	.047	200		P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
C20	47			SI 47	D6-470	DC-470	GP-47	UC-5447	5GA-Q47	
C21	30		47X669							N330 10%
C23	.1	400		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C28	1.5			NPO-SI 1.5	TCZ-1R5	CTA6V15C	TCO-1.5	Z7-5515	5TCCB-V15	
C34	15			NPO-DI 15	D0-150	L10Q15	ED-15		MS-415	10%
C35A	1000			BPD-2X001	DD2-102	BYC6D01	ED2-001	DCD521	5HK-2D1	
B	1000									
C36	5000			BPD-005	DD-502	BYA10D5	ED-005	DC535	5HK-D5	
C37	1000			BPD-001	DD-102	BYA8I2	ED-001	DC521	5HK-D1	
C38	5000			BPD-005	DD-502	BYA10D5	ED-005	DC535	5HK-D5	
C39	.0047	600		P688N-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C40	5000			BPD-005	DD-502	BYA10D5	ED-005	DC535	5HK-D5	
C41	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C42	.01	400		P488N-01	D6-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C43	.01	400		P488N-01	D6-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C44	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C45	.047	200		P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
C46	.1	400		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C47	18		RCM20B180K	1469-00001S	D6-180	22R5Q18	ED-18		MS-418	10%
C48	82		RCM30B820K	1469-00008S	D6-820	22R5Q82	ED-82		MS-482	10%
C49	100			1469-001	D6-101	22R5T1	ED-100	MCB235	MS-31	10%
C50	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C51	.047	200		P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
C52	.047	200		P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	
C53	.033	200		P288N-033	DD-403	CUB4S23	ED-03	GEM-4123	2TM-S23	
C54	.47	200		P288N-47		CUB2P47		GEM-2047	2TM-P47	
C55	220			1469-00023	D6-221	22R5T22	ED-220		MS-322	10%
C56	.01	400		P488N-01	D6-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C46	820		RCM20B821K	1464-00082		1R5T82	ED-820		MS-382	10%
C47	170-700		17A271							
C48	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C49	1000			BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D1	
C50	.047	400		P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C51	68	5000	47X755							10%
C52	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C53	.22	400		P488N-22		CUB4P22		GEM-4022	4TM-P22	
C54A	1000			BPD-2X001	DD4-102	BYC6D01	ED4-001	DCD-521	5HK-2D1	
B	1000									

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	Wells-Gardner PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	750Ω	½	78X31				U116S	Contrast
B	1meg	½					Not Req.	Volume
C	Switch						Not Req.	
R2A	1meg	½	40X428	AB-69	A47-1meg-S	Q11-137	U54	Vert. Hold
B	Shaft			AK-8 *	RS-3/16 *	NQ	D6-37 *	
R3A	50K	½	40X427	AB-31	A47-50K-S	Q11-123	U35	Horiz. Hold
B	Shaft			AK-8 *	RS-3/16 *	NQ	D6-37 *	
R4A	7-10meg	½	40X429				U82 †	Range
B	Shaft						Not Req.	
R5A	570K	½	40X426	AB-59	A47-500K-S	Q11-133	U50	Brightness
B	Shaft			AK-8 *	RS-3/16 *	NQ	D6-37 *	
R6A	1500Ω	½	40X399	AB-8	A47-1500-S	Q11-109	PTA152L	Vert. Lin.
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R7A	2.5meg	½	40X398	BX-83	A47-2.5meg -S	Q11-239	TA455L	Height
B	Shaft			Not Req.	FK3-1/4	TQ	Not Req.	
R8	500Ω	2(WW)	40X397		39-500		FL-500	Buzz

* File flat as needed to fit knob.
† Do not solder any wires to left hand terminal.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise stated.

ITEM No	RATING OHMS	RATING WATT	Wells-Gardner PART No	NOTES
R9	2.2meg			
R10	5600Ω			
R11	470Ω			
R12	47Ω			
R13	1000Ω			
R14	68K			
R15	470Ω			
R16	47Ω			
R17	470Ω			
R18	22K			
R19	470Ω			
R20	180Ω			
R21	1meg			
R22	3900Ω			
R23	1meg			
R24	47Ω			
R25	3600Ω	4	43X331	
R26	180K			
R27	10meg			
R28	100K			
R29	680Ω			
R30	4700Ω			
R31	330K			
R32	330Ω	1		
R33	470Ω	1		
R34	10K			
R35	2.2meg			
R36	820K			
R37	680K			
R38	47K			
R39	6800Ω			

ITEM No	RATING OHMS	RATING WATT	Wells-Gardner PART No	NOTES
R40	4700Ω			
R41	470K			
R42	390K			
R43	22K		B84223	
R44	6800Ω			
R45	2.2meg			
R46	180Ω		B84181	
R47	1000	1		
R48	15K			
R49	5600Ω			
R50	560Ω			
R51	330K			
R52	820K			
R53	220K			
R54	120K			
R55	82K			
R56	330K			
R57	3900Ω			
R58	82K			
R59	22K			
R60	10K			
R61	56K			
R62	1meg			
R63	68Ω			
R64	470K			
R65	10K	2		
R66	100Ω	2		
R67	5600Ω			
R68	1300Ω	10	43X299	
R69	6.5Ω	5	43X303	
R70	52Ω	10	43X302	

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: Wells-Gardner PART No	Halldorson PART No.	Merit PART No.	Ram PART No	Stancor PART No	Thordarson PART No.	Triad PART No.	NOTES
T1	Vert. Osc	54X19-A	B6702	A-3003	V405	A-8125	26A03	A-97X	
	Alt. Vert. Osc.	54X19							
T2	Vert. Output	51X186B	Z1900 ①②	A-3038 ①	V307 ①③	VO-100 ③	26873 ③	A-118X ③	
	Alt. Vert. Output	51X186							
T3A	Yoke-Horiz. (24.5MH)	9A-2403 ④	DF807 ⑤⑥	MDF-92 ⑤ ⑦	Y90F19/43 ⑤ ⑥	DY-18A ⑤ ⑥	Y-16 ⑤ ⑥	Y-45 & NW21 ⑤	
B	(90°)-Vert. (39MH)								
M6	Rear Cover & Centering Device	2A435						YCI	
	Yoke Clamp	30X811						CLI	
	Rubber Strip	8X247							
T4	Horiz. Output	53X362C	FB419 ③*	HVO-36 ③	X094 ③*	HO-283*	FLY-16 ③*	D-121 *	
	Alt. Horiz. Output	53X362	FB419 ③*	HVO-36 ③	X094 ③*	HO-283*	FLY-18 ③*	D-121 *	

① Connect as autoformer.
② Use 9 to 1 turns ratio.
③ Drill new mounting hole(s).
④ Includes resistors (R49, R50).
⑤ Use original rear cover, centering device and horizontal damping network.
⑥ Connect same as original.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4	9	9	9	6	9	4
7	7	7	7	3	7	3
8	See Note ⑦ NC	See Note ⑦ NC	See Note ⑦ NC	#	See Note ⑦ NC	2
5	1	1	1	1	1	1
Special Notes →	⑦	⑦	⑦		⑦	

⑦ Install new damping network consisting of approximately 50mmf in series with resistor (R67) across horizontal yoke terminals #3 and #7.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	Wells-Gardner PART No.	REPLACEMENT DATA: Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No	Triad PART No.	NOTES
T5	6100Ω	3-4Ω	51X165	Z1110	A-3026	AU-602	A-3877	24S51	S-6X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: Wells-Gardner PART No.	QUAM PART No.	NOTES
SP1	6"	PM	3-4Ω	12A528 ①	6A1	① Console Models
	5"	PM	3-4Ω	12A527 ②	5A07	② Alternate used in Console Models
	2½"x10"	PM	3-4Ω	12A549 ③		③ Table Models

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: Wells-Gardner PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No	NOTES
L1	39MC Trap	9A2368			4302		
L2	1st. Video IF	9A2365	17-4534	TV-131	4308	VF-4	
L3	2nd. Video IF	9A2363	17-4536		6222		Includes 47.25MC Trap
L4	3rd. Video IF	9A2414	17-4535		6221		Includes 41.25MC Trap
L5	4th. Video IF	9A2370	17-4514				Includes Assy.
L6	Resonant Choke	9A2375					30 Microhenries
L7	Shunt Peaking Coil	36A12	19-4160 *	TV-134 *	6L40 *		160 Microhenries, wound on 22K resistor

COILS (cont)

ITEM No	USE	REPLACEMENT DATA: Wells-Gardner PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No	NOTES
L8	4.5MC Trap	9A2366	20-1004	TV-151	1469 ▲		SF-3
L9	Series Peaking Coil	36A48	19-4400 *	TV-190 *	6L32 *		VP-7 * 350 Microhenries, wound on 6800Ω resistor
L10	Shunt Peaking Coil	36A33	19-3250 †	TV-185 †	6L81 †		VP-8 † 225 Microhenries, wound on 2200Ω resistor
L11	Sound IF	9A2400	17-1026	TV-154	1470A ▲		
L12	Quadrature Coil	9A2367	20-1005	TV-121	1480		
L13	RF Choke	9A2380	19-1001	BC-562	4804		1.5 Microhenries

* Parallel with 22K resistor. ▲ Disregard tap.
* Parallel with 5800Ω resistor. ▲ Drill mounting holes
† Parallel with 2200Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No	DC RES PRI	DC RES SEC	Wells-Gardner PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No	NOTES
L14	74Ω *		9A2371		TV-155	6211 ▲		HS-7	Horiz. Freq
L15	56Ω		9A2372			6215 ▲		HS-5 ▲	Horiz. Waveform

* Tapped @ 5Ω.
▲ Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS CURRENT (Measured)	RATINGS DC RES.	RATINGS INDUCTANCE @ CURRENT 1000 ~/s	Wells-Gardner PART No.	REPLACEMENT DATA: Halldorson PART No.	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
L16	.260A	40Ω	1 Hy.	52X95-6	C5037 ①	C-2991 ①		C-2326 ①	28C43 ①	C-27X

① Drill new mounting hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Wells-Gardner PART No	REPLACEMENT DATA	
K1	Sync Coupling	330mmf, 150K	78X13		
K2	Vert. Integrator	2000mmf, 5000mmf, 5000mmf, 22K, 8200Ω, 8200Ω	78X7	Aerovox	PA-110
				Centralab	PC-104
				Cornell-Dubilier	115TMG
				Erie	1405-01
				Sprague	Y-1
K3	Chassis Isolation	470mmf, .3-1meg	78X21	Centralab	RC-471
				Sprague	R-9477

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	Wells-Gardner PART No.	REPLACEMENT DATA: FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No	SARKES TARZIAN PART No.	NOTES
M1	260A	66X14 ①	1090A ①	1N1007 ②	RS3006L ①	300 ①	① Selenium type.
					S094A ③	M500 ③	② Germanium type.
M2	260A	66X14 ①	1090A ①	1N1007 ②	RS3006L ①	300 ①	③ Silicon type.
					SD94A ③	M500 ③	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	Wells-Gardner PART No.	REPLACEMENT DATA: CBS PART No.	SYLVANIA PART No	NOTES
M3	1N60 *		1N60	1N60	Video Detector (Pigtail)

* Some versions may use CK706 in this application

MISCELLANEOUS

ITEM No	PART NAME	Wells-Gardner PART No.	NOTES
M4	Tuner	25A1161	VHF (Standard Coil #NAS-4139)
	Tuner	25A1160	VHF (Standard Coil #NAS-4145)
	Tuner	25A1159	UHF (Standard Coil #NEUFS-103)
M5	Circuit Breaker	2A475	Thermal cutout
M6	Centering Device	2A435	Includes yoke cover
	Magnet	2A476	Beam alignment used with some picture tubes

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

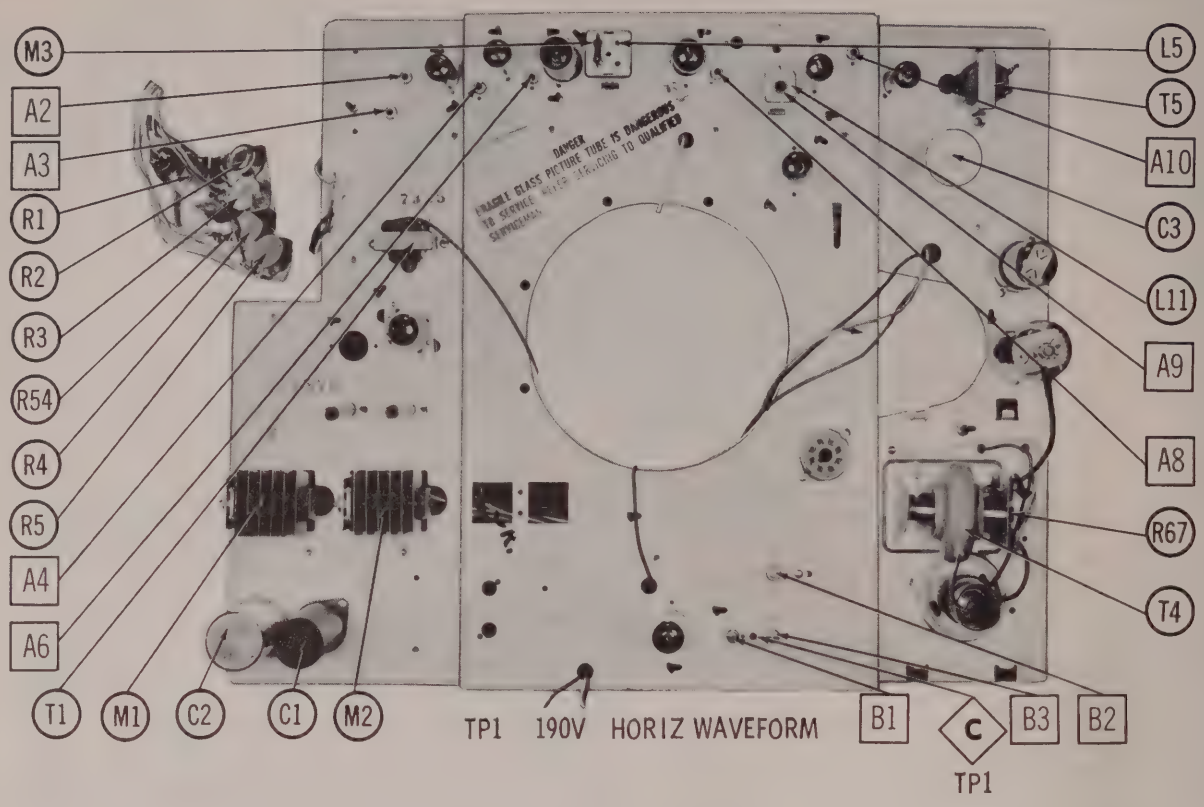
NAME	PART NO	DESCRIPTION
Safety Glass	17X194-1	
Knob	10A899-1	Channel Selector
Knob	10A893-2	UHF Tuning
Knob	10A894-3	UHF Indicator
Knob	10A895-1	Fine Tuning
Knob	10A896-1	Contrast
Knob	10A897-1	On-off-volume
Knob	10A861-1	Brightness, range, horiz. hold, vert hold

WIRING DATA

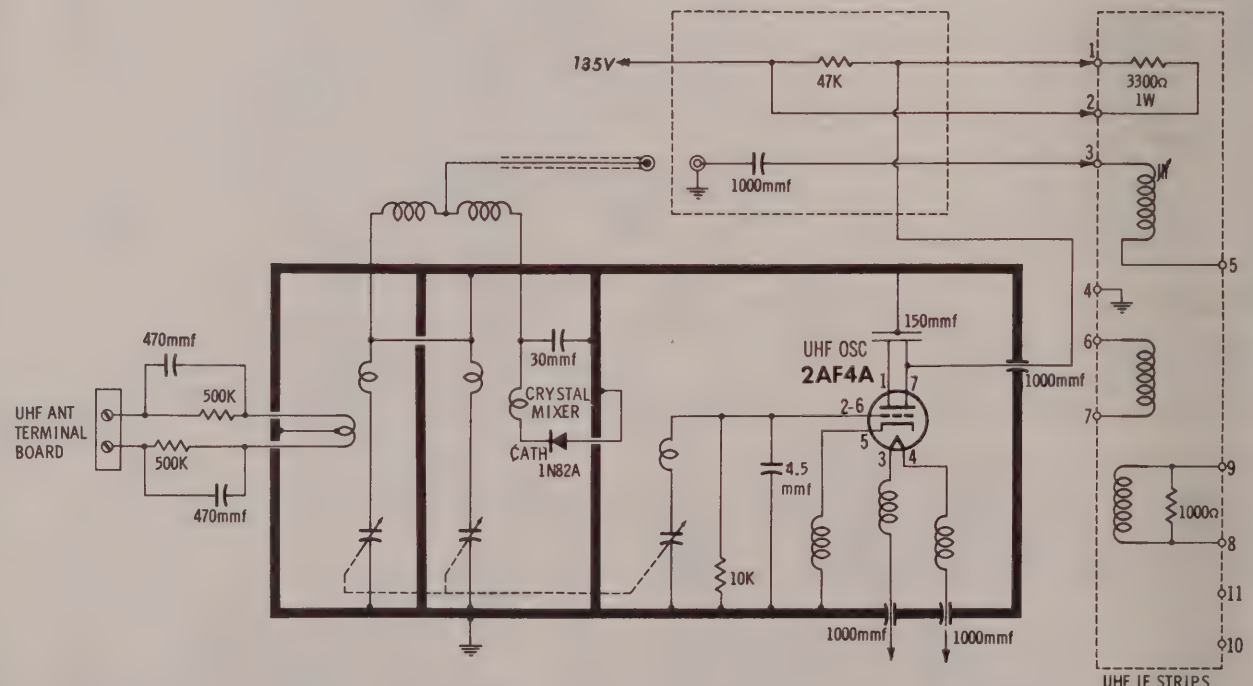
High Voltage Lead	Use BELDEN No.	[redacted]
Shielded Hook-up Wire	Use BELDEN No.	8885 (Single Conductor)
		8736 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors
		8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No.	[redacted]
300Ω Tuner Input Lead	Use BELDEN No.	[redacted]
300Ω Antenna Lead-in	Use BELDEN No.	8230 or 8275
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) - 4 Conductor
		8485 (Round) - 5 Conductor
		8488 (Round) - 8 Conductor

WELLS-GARDNER MODELS 321N73-A-3701, 321N73-A-3750, 321N73-A-3762, 321N73-A-3791, 321N73-A-3703, 321N73-A-3732, 321N73-A-3763, 321N73-3793, 321N73-A-3798

FOLDER 3



CHASSIS TOP VIEW



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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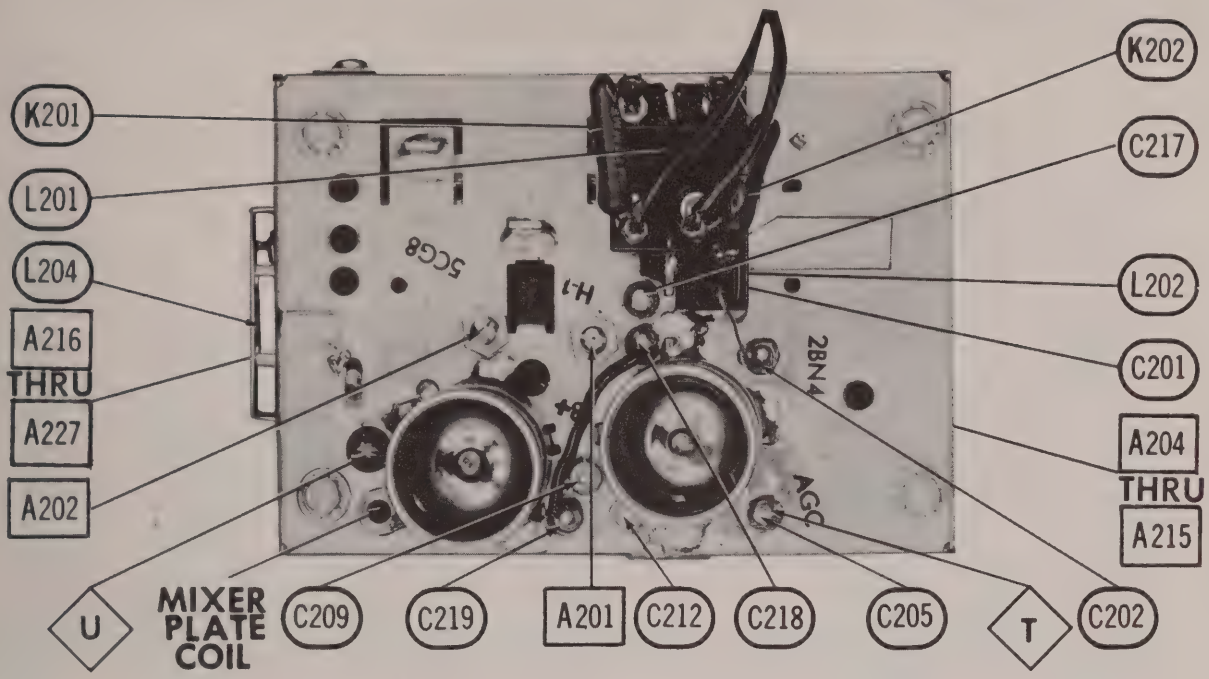
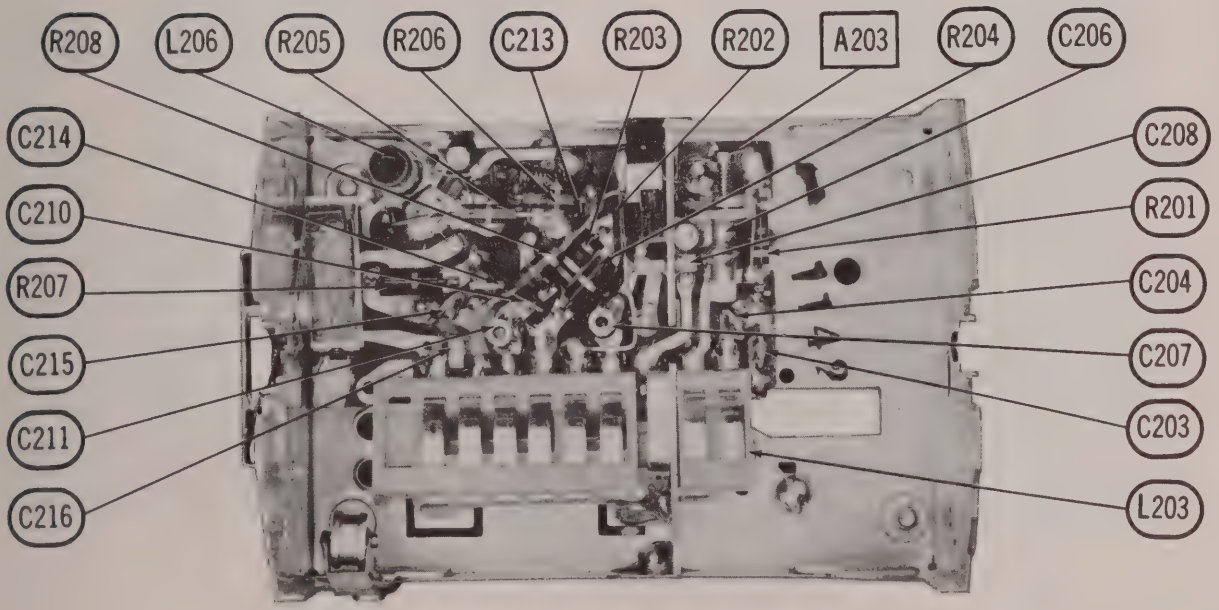
UHF TUNER #25A1159



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amplifier	2BN4	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	5CG8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	120			NPO-DI 120	TCZ-120	C10T12C	TCO-120		5TCC-T12	10%
C202	30		13M320EA300J-05							
C203	28		13R-005							10%
C204	12		13R-003							10%
C205	800		13M320EA801Z-04							
C206	1.5-4.5				829-6		532-B			
C207	1-4.5		31B-902-07		829-6		532-B			
C208	47		13M130U470J							5%
C209	800		13M320EA801Z-04							
C210	47									10%
C211	1.4.5		31B-902-07		829-6		532-B			
C212	30		13M320EA300M-06							
C213	1000		13R-024							
C214	3		13R-011							10%
C215	6.8		13R-014							N330
C216	2.0		13R-009							5%
C217	800		13M320EA801Z-04							
C218	800		13M320EA801Z-04							
C219	800		13M320EA801Z-04							

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		PART No.	NOTES
	OHMS	WATT		
R201	4700Ω			
R202	1000Ω			
R203	3900Ω			
R204	220K			

ITEM No.	RATING		PART No.	NOTES
	OHMS	WATT		
R205	1000Ω			
R206	10K			
R207	10K			
R208	6800Ω			

COILS (RF-IF)

ITEM No.	USE	PART No.	NOTES
L201	Ant. Trans.	31T-2107-01	
L202	IF Trap Coil	34A-748	
L203	IF Trap Coil	31TA-2109	
L204A	Ant., RF, Mixer Grid, Osc. Coils	31M-300-2N4A	Channel 2
B	"	31M-300-3N4A	Channel 3
C	"	31M-300-4N4A	Channel 4
D	"	31M-300-5N4A	Channel 5
E	"	31M-300-6N4A	Channel 6
F	"	31M-300-7N4A	Channel 7
G	"	31M-300-8N4A	Channel 8

ITEM No.	USE	PART No.	NOTES
L204H	Ant., RF, Mixer Grid, Osc. Coils	31M-300-9N4A	Channel 9
I	"	31M-300-10N4A	Channel 10
J	"	31M-300-11N4A	Channel 11
K	"	31M-300-12N4A	Channel 12
L	"	31M-300-13N4A	Channel 13
L205	RF Choke	25A-176-01	
L206	Mixer Plate Coil	31U-530-01	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PART No.	REPLACEMENT DATA	
K201	Antenna Isolation	470mmf, .3-1meg	13P-198	Centralab Sprague	RC-471 R-9177
K202	Antenna Isolation	470mmf, .3-1meg	13P-198	Centralab Sprague	RC-471 R-9177

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
	Drum Osc. Slug	31T-2073-171-02 15A-266	Less strips 12 required

NOTE : Part numbers listed above are "Standard Coil" part numbers.

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

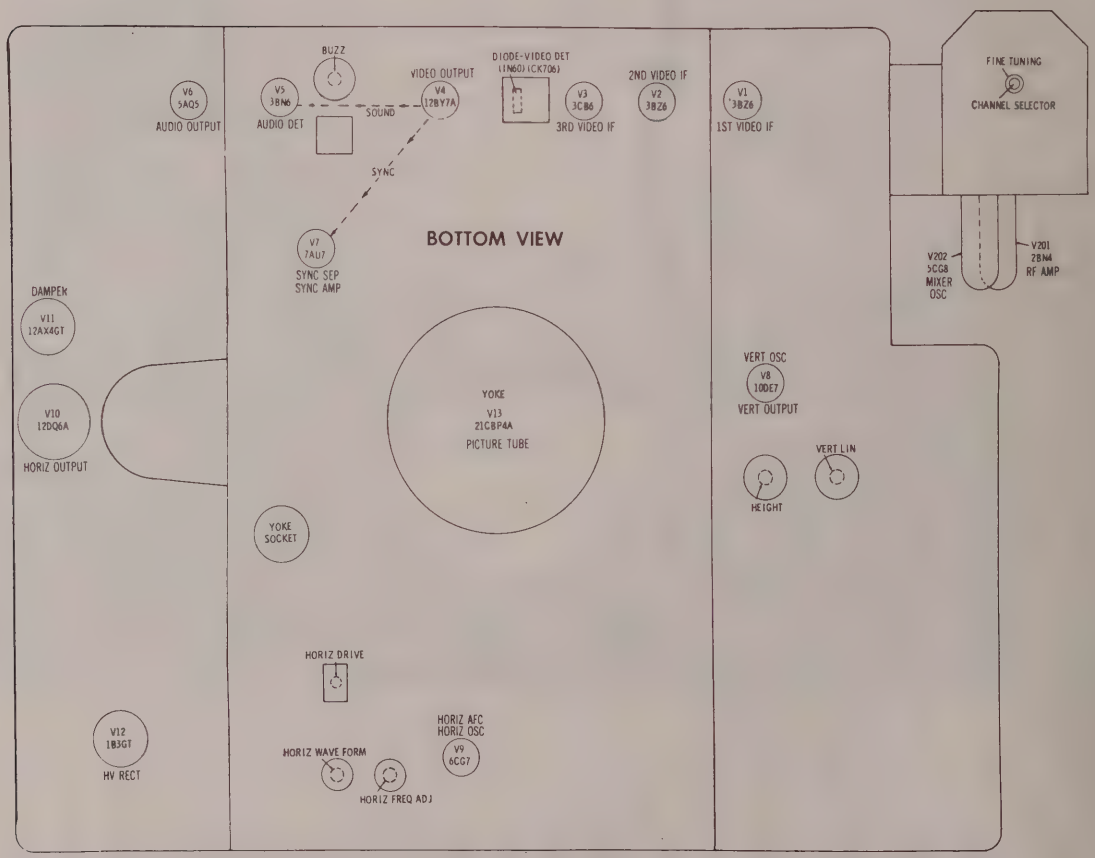
WELLS-GARDNER MODELS 321N73-A-3701, 321N73-A-3750, 321N73-A-3762,
321N73-A-3791, 2321N73-A-3703, 2321N73-A-3752,
2321N73-A-3763, 2321N73-A-3793, 3321N73-A-3798

FOLDER 3

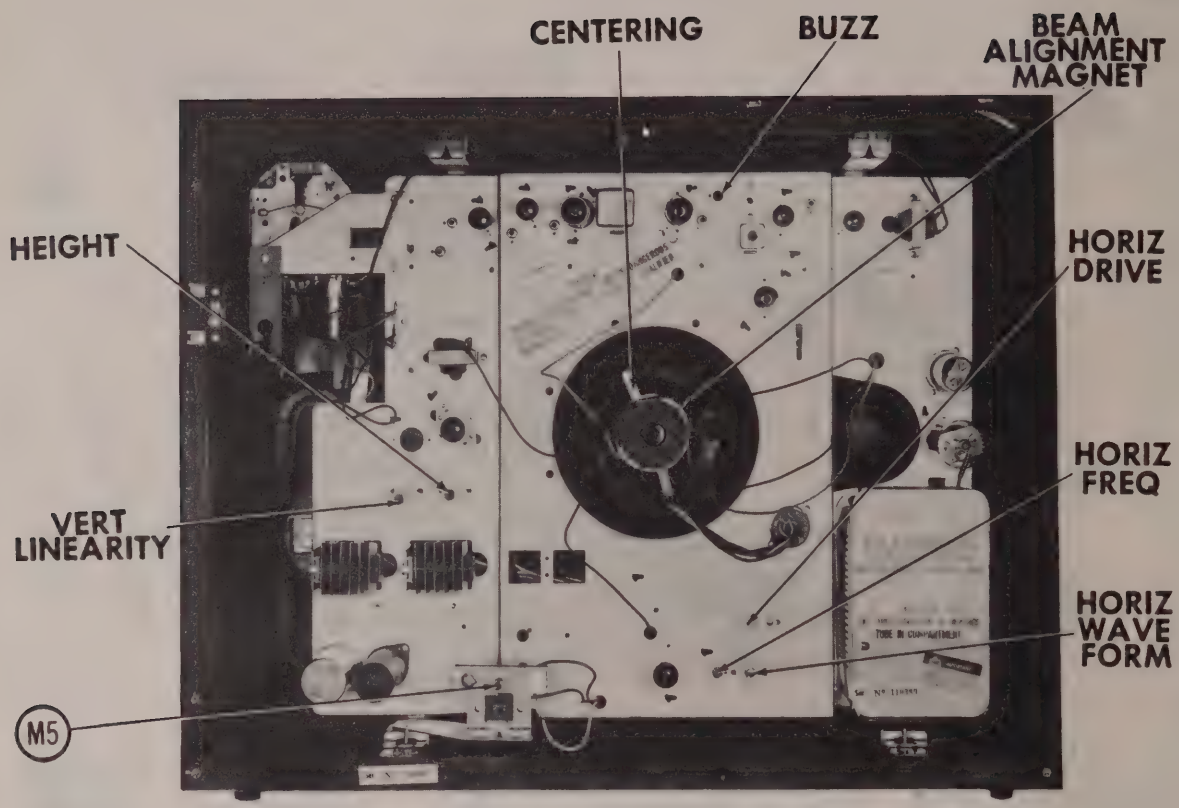
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	1meg	47Ω	10Ω	10.5Ω	†2200Ω	†2200Ω	0Ω		
V2	3BZ6	1meg	47Ω	10.5Ω	11.5Ω	†2200Ω	†2200Ω	0Ω		
V3	3CB6	.1Ω	180Ω	11.5Ω	12Ω	†1700Ω	†1700Ω	0Ω		
V4	12BY7A	•190Ω	1meg	0Ω	13Ω	13Ω	14Ω	†3600Ω	†1200Ω	0Ω
V5	3BN6	•280Ω	2.6Ω	10Ω	9.5Ω	†5900Ω	5.5Ω	†330K		
V6	5AQ5	0Ω	330Ω	13Ω	12Ω	†890Ω	†470Ω	0Ω		
V7	7AU7	†820K	2.2meg	0Ω	14Ω	14Ω	†13K	45K	0Ω	15Ω
V8	10DE7	†370Ω	2.2meg	2.2meg	16Ω	15Ω	•‡1.9meg	• 750K	160Ω	• 1400Ω
V9	6CG7	†56K	410K	0Ω	9.5Ω	8.5Ω	•† 13K	1.5meg	410K	0Ω
V10	12DQ6A	TP	4Ω	NC	†10K	470K	NC	7Ω	100Ω	TOP CAP ‡10Ω
V11	12AX4GTA	NC	NC	¶	NC	†.1Ω	NC	4Ω	1.5Ω	
V12	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡317Ω
V13	21CBP4A	7Ω	22K	PIN 6 †100K	PIN 10 ‡10meg	PIN 11 • 260K	PIN 12 8.5Ω			
V201	2BN4	0Ω	1meg	1.5Ω	1Ω	†2300Ω	0Ω	1meg		
V202	5CG8	10K	†8100Ω	0Ω	0Ω	1Ω	†2300Ω	†11K	0Ω	220K

¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 250V SOURCE.
‡ MEASURED FROM PIN 3 OF V11.
NC NO CONNECTION.
TP TIE POINT.



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the horizontal hold control fully clockwise. Tune in a station and adjust the horizontal frequency slug (B1) until the picture is just about to tear out of sync as can be seen at the top of the picture.

Turn the contrast control fully counter clockwise and the brightness control clockwise so that the picture appears washed out. Turn the horizontal drive trimmer (B2) clockwise until white vertical bars (drive lines) appear in the left center portion of the raster, then counter clockwise until the white bars just disappear.

Connect the vertical amplifier of the scope to point Ⓒ . Low side to chassis. Adjust the horizontal waveform slug (B3) until the round and sharp peaks of the waveform are equal in amplitude. (See Fig. 4). Keep the picture in sync during this adjustment.

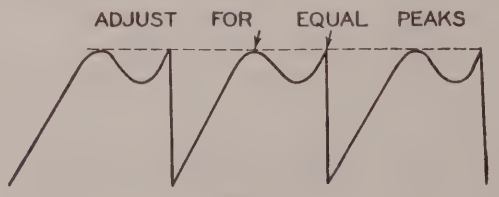


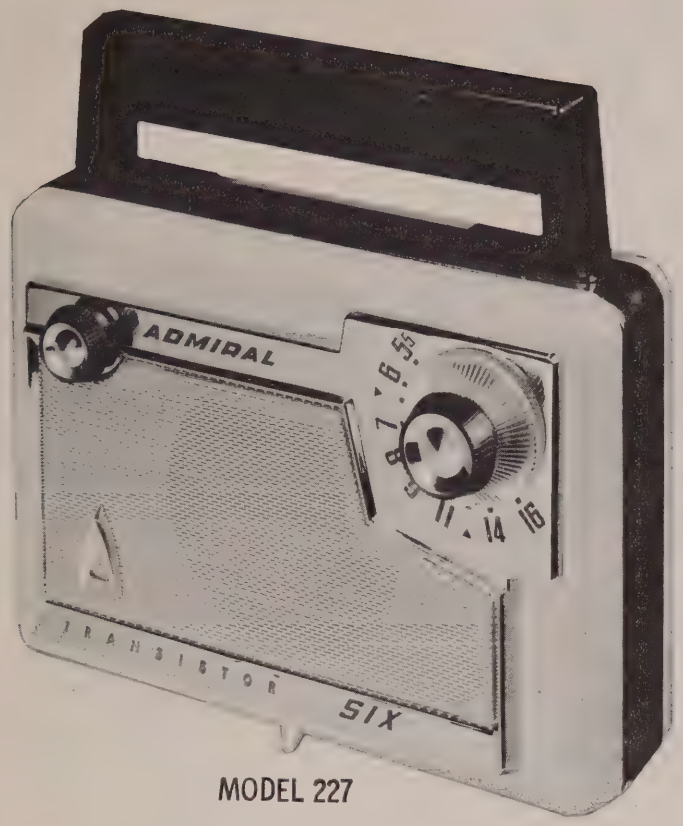
FIG. 4

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

ADMIRAL MODELS
221, 227, 228 (Ch. 6S2)

ADMIRAL MODELS
221, 227, 228 (Ch. 6S2)



MODEL 227

ADMIRAL MODELS
221, 227, 228 (Ch. 6S2)

TRADE NAME	Admiral Models 221, 227, 228 (Ch. 6S2)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago 47, Illinois
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	12 Volts DC
RATING	7.7MA @ 12 Volts DC (No signal, Min. volume)
TUNING RANGE—BROADCAST	535 - 1620KC
	8.5MA @ 12 Volts DC (Signal, Normal volume)

DISASSEMBLY

1. Open rear cover and remove battery case.
2. Remove two push-on type control knobs.
3. Loosen two Phillips head screws on front of cabinet near tuning shaft.
4. Loosen hex nut holding volume control shaft to front of case.
5. Hold printed board and remove the two screws and hex nut.
6. Carefully remove printed board from case.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400∿ Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1620KC	"	"	A4	"
3.		"	1400KC	Tune to 1400KC signal	"	A5	"
4.		"	600KC	Tune to 600KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 and 3.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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H557

SET 413 FOLDER 4

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N252	Converter			2N485		
X2	2N309	IF Amplifier					
X3	R83	AVC		2N405	2N363		
X4	R56	Driver		2N407	2N363		
X5	R56	Output		2N109	2N361		
X6	R56	Output		2N109	2N361		

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ADMIRAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	100	12	67B32-6	SRE12V100	EC317	TT15X100			TE-1162
C2	100	12	67B32-6	SRE12V100	EC317	TT15X100			TE-1162
C3	3	3	67B32-14 ①	PWE3003	NL3-6		ML4-6		TE-1082
C4	10	3	67B35-6	PWE3010	NL10-3	TT3X10	ML10-6		TE-1053
C5	90	3	67B32-10	PWE3100	NL100-6	TT6X100	ML100-3		TE-1102

① Early versions may use 25mfd. Replace with 3mfd.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	ADMIRAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	10000		65D10-41	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C7	5000		65D10-152	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C8	8.2		65D10-131						NPO
C9	3.3		65D6-89	NPO-DI 3.3	DTZ-3R3	C10V33C	ZT-5533	5TCCB-V33	NPO
C10	50000		65B45-6	BPD-05				TG-S50	
C11	50000		65B45-6	BPD-05				TG-S50	
C12	50000		65B45-6	BPD-05				TG-S50	
C13	.56		65B45-12						
C14	50000		65B45-6	BPD-05				TG-S50	
C15	50000		65B45-6	BPD-05				TG-S50	
C16	2000		65D10-125	BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C17	20000		65D10-137	BPD-02	DD-203	BYB6S2		5HK-S2	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ADMIRAL PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2500Ω	½	75C25-9					Volume and Switch

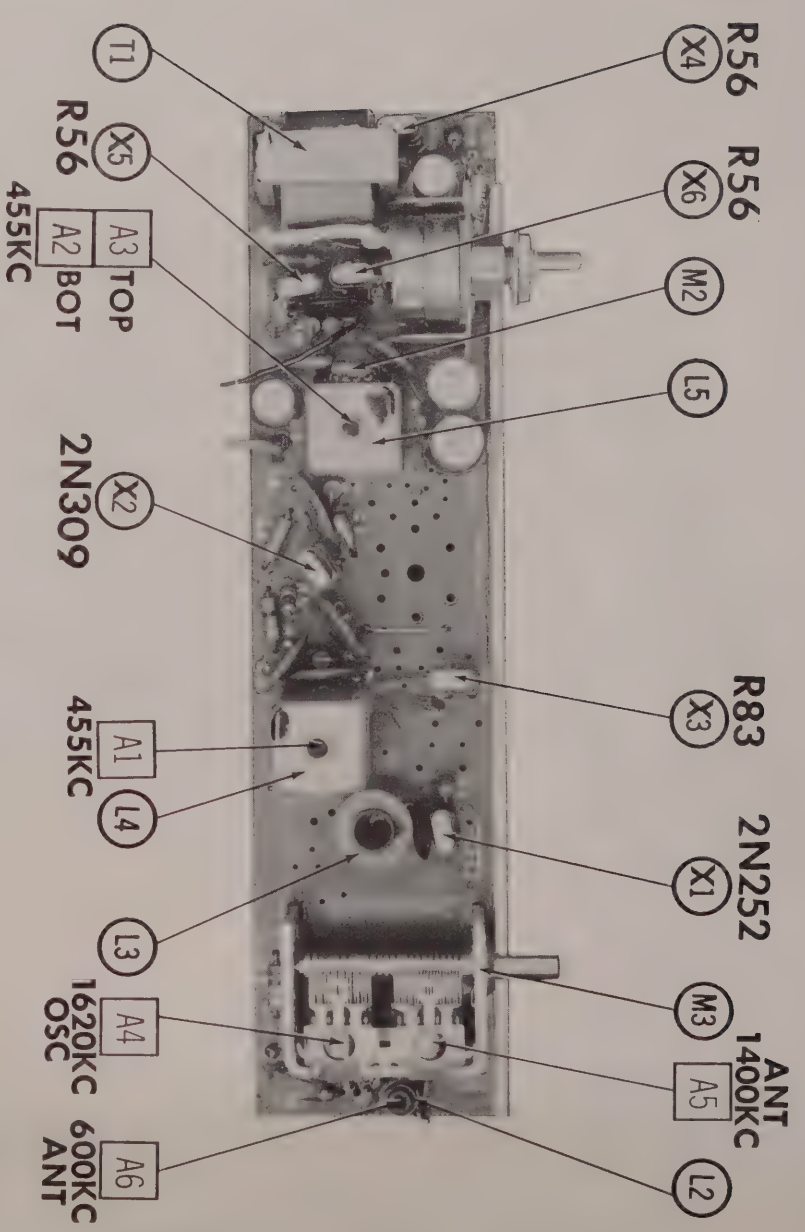
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		ADMIRAL PART No.	NOTES
	OHMS	WATT		
R2	8200Ω		60B8-822	
R3	56K		60B8-563	
R4	3300Ω		60B8-332	
R5	12K 5%		60B7-123	
R6	2700Ω		60B8-272	
R7	180Ω		60B8-181	
R8	1000Ω		60B8-102	
R9	150K		60B8-154	
R10	2700Ω		60B8-272	

ITEM No.	RATING		ADMIRAL PART No.	NOTES
	OHMS	WATT		
R11	24K 5%		60B7-243	
R12	5600Ω		60B8-562	
R13	1000Ω		60B8-102	
R14	7500Ω 5%		60B7-752	
R15	100Ω		60B8-101	
R16	10Ω		60B8-100	
R17	10Ω		60B8-100	
R18	100Ω		60B8-101	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		ADMIRAL PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Stick	69B225-1					
L2	Antenna Coil	69B224-1					
L3	Osc. Coil	69B223-1					
L4	Input IF	72C189-2					
L5	Output IF	72C190-3					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ADMIRAL PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1.2	:1	79B76-2							

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ADMIRAL PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	794Ω CT	3-4Ω	Part of SP1							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ADMIRAL PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	78B133-3 ①	4A07 ②	① Includes T2 ② Slot mounting holes for tabs in cabinet.

BATTERIES

ITEM No.	VOLTAGE	ADMIRAL PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V			1		635		M-14	Eight used.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		ADMIRAL PART No.	CBS PART No.	SYLVANIA PART No.	
M2	1N295		1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M3	Tuning Cap. Printed Board	68B66-3 14E212-1	2 Gang (Ant. 21-303mmf)

CABINETS & CABINET PARTS

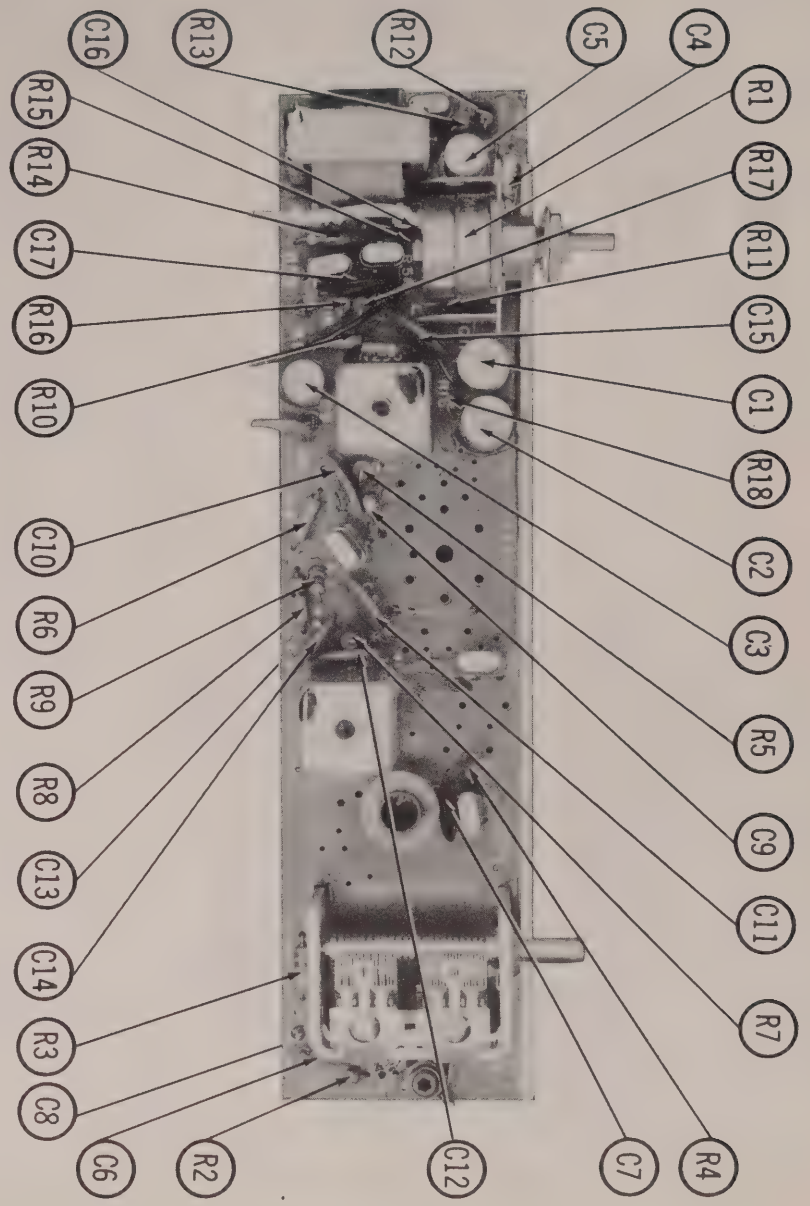
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

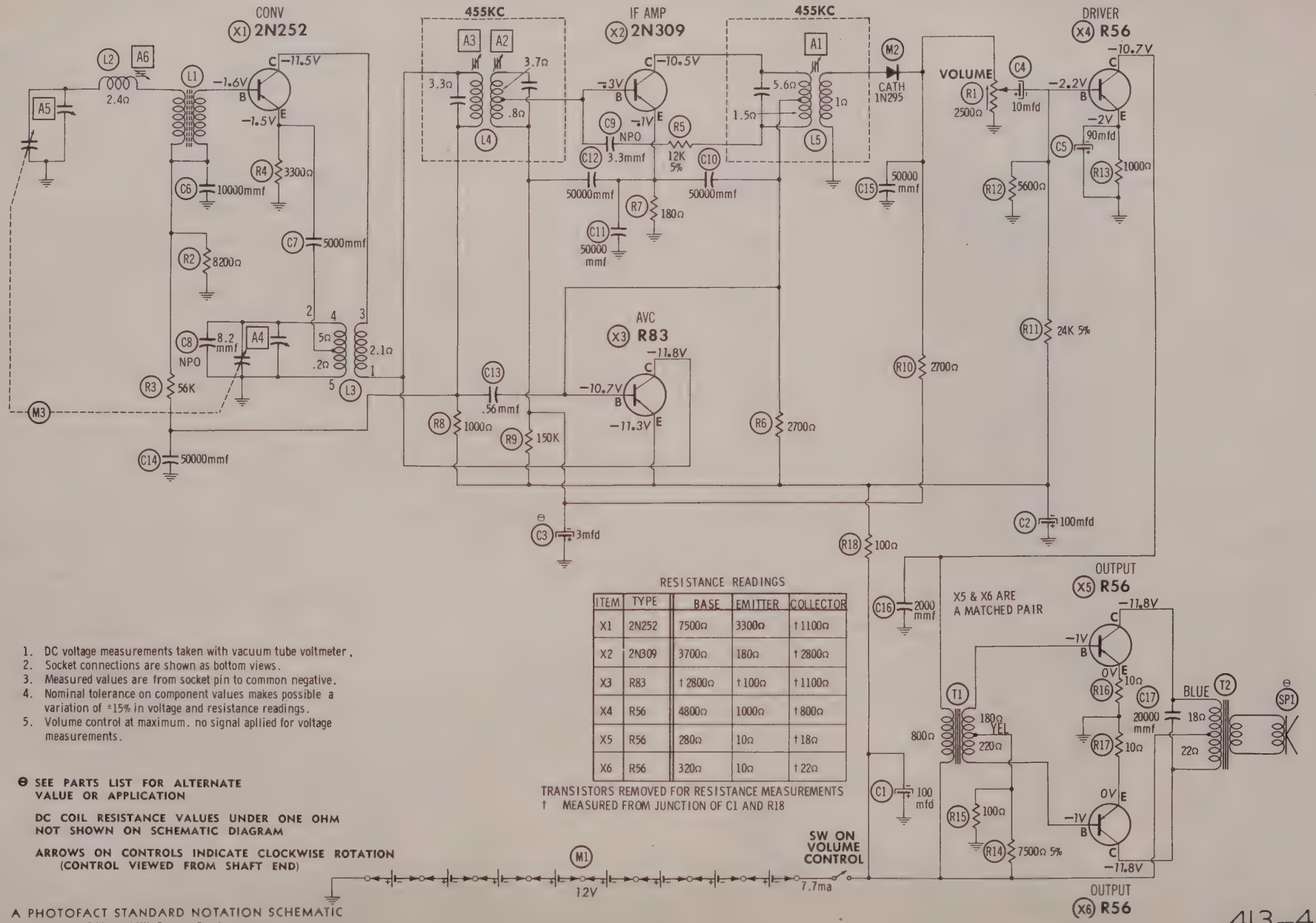
NAME	PART NO.	DESCRIPTION
Knob	33C232-3	Tuning, Black and Clear
Knob	33C232-6	Tuning, Brown and Clear
Knob	33C232-1	Volume, Black
Knob	33C232-4	Volume, Brown
Cabinet	34E124-2	Tan, Model 227, Less Handle, Escutcheon and Grille
Cabinet	34E124-1	Black Model 221, Less Handle, Escutcheon and Grille
Cabinet	34E124-3	Turquoise, Model 228, Escutcheon and Grille

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW





RESISTANCE READINGS

ITEM	TYPE	BASE	EMITTER	COLLECTOR
X1	2N252	7500Ω	3300Ω	†1100Ω
X2	2N309	3700Ω	180Ω	†2800Ω
X3	R83	†2800Ω	†100Ω	†1100Ω
X4	R56	4800Ω	1000Ω	†800Ω
X5	R56	280Ω	10Ω	†18Ω
X6	R56	320Ω	10Ω	†22Ω

TRANSISTORS REMOVED FOR RESISTANCE MEASUREMENTS
† MEASURED FROM JUNCTION OF C1 AND R18

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum. no signal apllied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PHOTOFACT* Folder

EIA

ALLSTATE
MODELS 6231, 6232

ALLSTATE
MODELS 6231, 6232

MODEL 6232

TRADE NAME	Allstate Models 6231 (Ch. 528.62310), 6232 (Ch. 528.62320)
MANUFACTURER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	Battery Operated Universal Type AM Automobile Receiver
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AV6 Det.-AVC-AF Amp. 12AQ5 Output, 12X4 Rectifier (6Volt Versions used in Model 6231)
POWER SUPPLY	12 Volt Storage Battery (Model 6232) RATING 2.2 Amp. @12 Volts DC
TUNING RANGE—BROADCAST	535-1605KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of 12BE6(V1). Low side to chassis.	455KC (400~ Mod.)	High frequency end stop.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1.	Thru dummy to antenna receptacle.	1610KC	"	"	A5	Adjust for maximum output.
3.	"	"	1400KC	Tune to 1400 KC signal.	"	A6	"

PUSHBUTTON ADJUSTMENT

1. Tune manually to desired station.
2. Loosen button by turning counterclockwise one or two turns.
3. Press pushbutton in firmly. Tighten pushbutton.
4. Repeat for remaining pushbuttons.

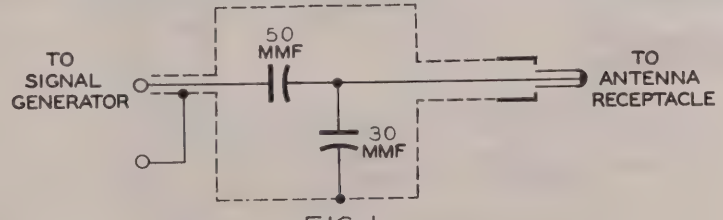

FIG. 1

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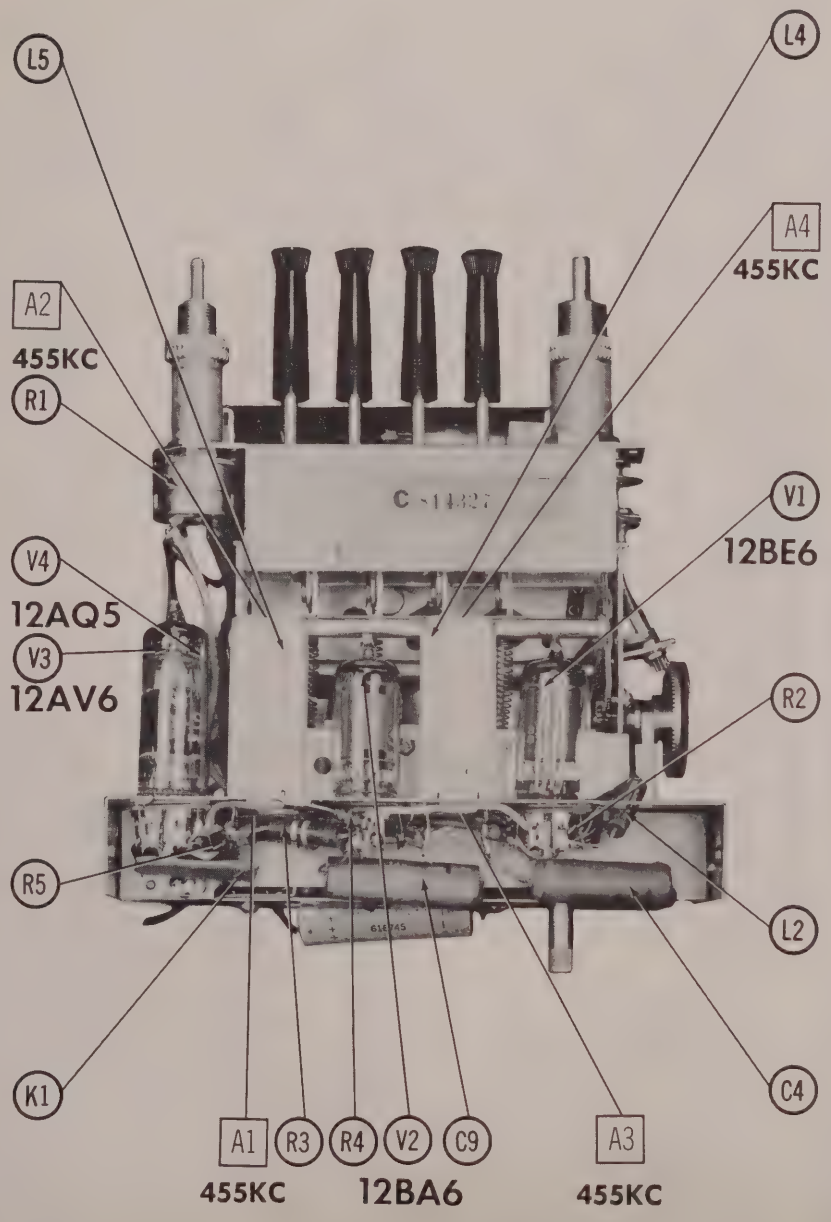
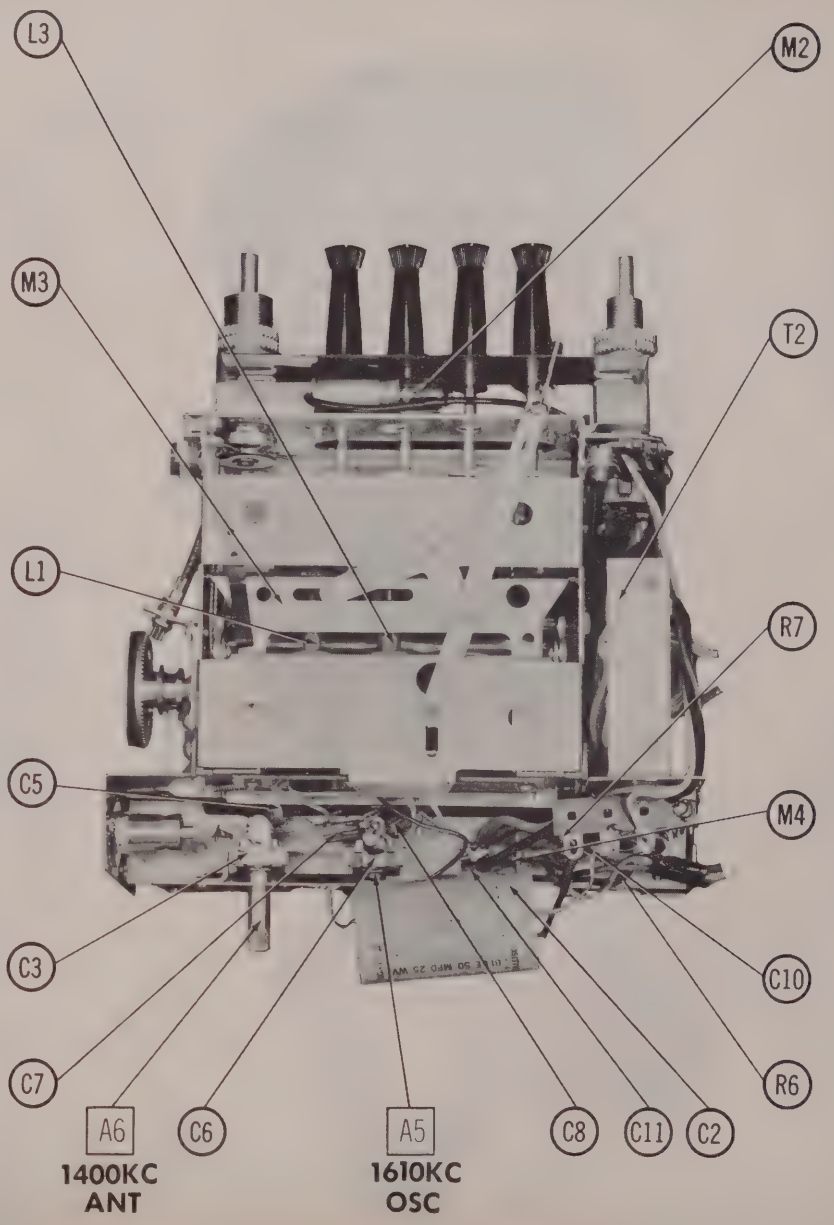


CHASSIS-TOP VIEW



CHASSIS-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det. -AVC-AF Amp.	12AV6	

ITEM No.	USE	TYPE	NOTES
V4	Output	12AQ5	
V5	Rectifier	12X4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ALLSTATE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	20	300	18-22-0	PRS450V1010	BR2035	TC65	TD-20-350	MT-4520	TVA-1608
C2A	30	250	18-68-5						R2673 *
B	50	25	①						

①Some versions may use 25mfd
* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	ALLSTATE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	15-160		T19-175-0						
C4	.05	200	T16-50343	P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C5	47		T15-47016	BPD-000047	DD-470	L10Q47	UC-5447	5GA-Q47	
C6	125-250		T19-198-0						
C7	150			1469-00015	D6-151	5R5T15		MS-315	10%①
C8	150			1469-00015	D6-151	5R5T15		MS-315	10% ②
C9	.05	400	T16-50323	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C10	5000		T15-50217	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C11	10000		T15-10317	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C12	.5	100	T20-21-1	P288N-5		CUB2P5	GEM-205	2TM-P5	
C13	.0068	1600	T16-68278	P1688N-0068		CUB16D68	GEM-16268	MB-D68	
C14	.5	100	T20-21-1	P288N-5		CUB2P5	GEM-205	2TM-P5	
C15	10000		T15-10317	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	

① Some versions may use 390mmf (Part #T17-39119), or 330mmf (Part#T17-33119) in this application.
② Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ALLSTATE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	250K	½	T24-306-0	AB-50 †	A47-250K-S‡			Volume
B	Shaft			AK-8	RS-3/16			
C	Switch			KB-4 or KR-4*	SWE-13			

† Use AK-26 Adaptor bushing. *Use KR on CRL "Red Label" controls and KB on "Blue Label" controls.
‡ Use XB-2 Adaptor bushing.

RESISTORS

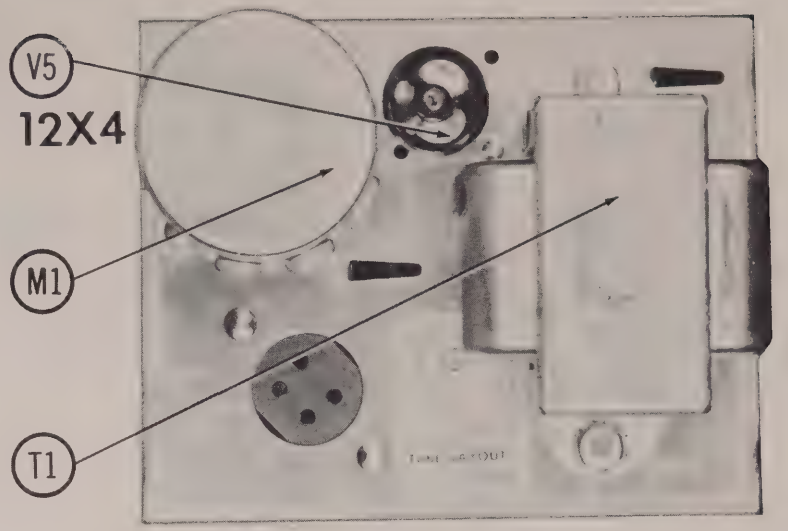
All wattages 1/2 watt, or less, unless otherwise listed.

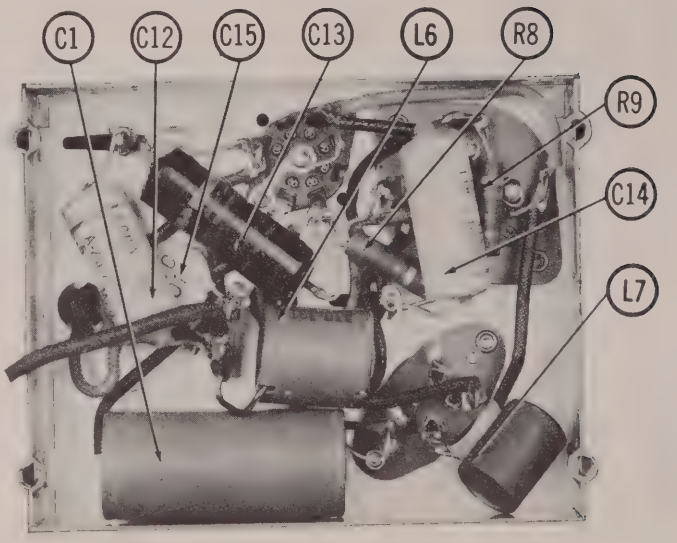
ITEM No.	RATING		ALLSTATE PART No.	NOTES
	OHMS	WATT		
R2	47K	1	S60-47301	
R3	15K		S60-15311	
R4	180Ω		S60-18101	Note 1.
R5	2.2meg		S60-22301	

ITEM No.	RATING		ALLSTATE PART No.	NOTES
	OHMS	WATT		
R6	180Ω		S60-18101	
R7	3000Ω	1	S60-33211	
R8	150Ω	1	S60-15111	Note 2.
R9	150Ω	1	S60-15111	Note 2.

Note 1. Some versions use 120Ω in this application (Part#S60-12101)
Note 2. Model 6231 uses 100Ω in this application (Part # S60-10102)

POWER CHASSIS





PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		ALLSTATE PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil						Note 1.
L2	Ant. Choke	T10-13-1					12.5 microhenries
L3	Osc. Coil						Note 1.
L4	Input IF	T10-42-2	16-6758	BC-352	12-C9	RF-1	
L5	Output IF	T10-43-2	16-6758	BC-353	12-C10	RF-2	
L6	"A" Lead Choke	T10-131-0					
L7	Hash Choke	T10-130-1					

Note 1. Part of M4

TRANSFORMER (VIBRATOR)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	ALLSTATE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	12.6VCT @ 1.2A	340VCT @ .040A		T80-22-0①	V3900					
	6.3VCT @ 1.9A	340VCT @ .040A		T80-21-0 ②		P-2969			22R55	V-21Z

① Used in Model 6232 ② Used in Model 6231

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	ALLSTATE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6400Ω	3-4Ω	T80-57-1		A2998			24S49	S-6X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ALLSTATE PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	T33-353-4	4A07	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ALLSTATE PART No.	REPLACEMENT DATA	
K1	Audio Coup. Net.	220mmf, 5000mmf, 5000mmf, 250mmf, 6.8meg, 470K, 470K	T13-9-3	Aerovox	PA-113-2
				Centralab	PC-151
				Cornell-Dubilier	116TM1
				Sprague	DT-4

PARTS LIST AND DESCRIPTIONS (Continued)

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				ALLSTATE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	12.6V	115∿	T34-110	6301	G859/G874	6301	Used in Model 6232
	"	6.3V	"	T34-109	5301	859	5301	Used in Model 6231

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ALLSTATE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2		15A 32V						

MISCELLANEOUS

ITEM No.	PART NAME	ALLSTATE PART No.	NOTES
M3	Lamp	T89-12	#1815, Model 6232
	Lamp	T89-7	Model 6231
M4	Tuner Ass'y.	T84-6052	Model 6232
	Tuner Ass'y.	T84-6052	Model 6231
M5	Spark Plate	T20-119-0	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

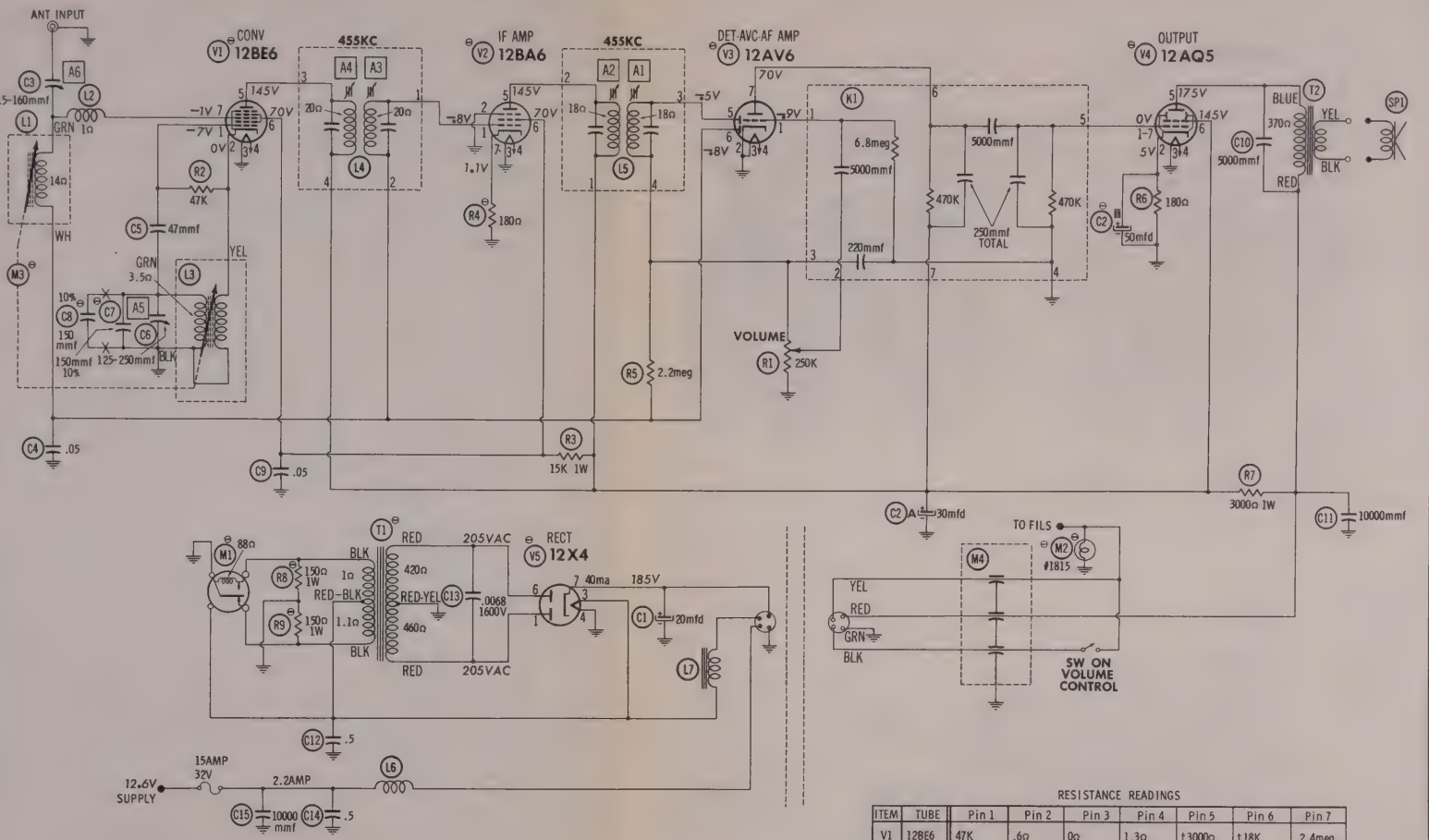
NAME	PART NO.	DESCRIPTION
Knob	T52-1048-0	Tuning and Volume
Case	T21-242-1	Control Unit
Cover	T21-246-0	Rear
Cover	T21-243-0	Tube
Dial Pointer	T52-20-1	
Cap	T21-290-0	Pushbuttons, Four used
Dial Scale	T67-645-0	Inverted
Dial Scale	T67-646-0	Upright

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
Use BELDEN No. 8524 (Stranded) Available in Ten Colors

Shielded Hook-up Wire ..... Use BELDEN No. 8885

Bonding Strap ..... Use BELDEN No. 8661



ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	47K	.6Ω	0Ω	1.3Ω	†3000Ω	†18K	2.4meg
V2	12BA6	2.4meg	0Ω	0Ω	1.3Ω	†3000Ω	†18K	180Ω
V3	12AV6	6.8meg	0Ω	0Ω	1.3Ω	250K	2.4meg	†470K
V4	12AQ5	470K	180Ω	0Ω	1.3Ω	†370Ω	†3000Ω	470K
V5	12X4	460Ω	NC	1.3Ω	0Ω	NC	420Ω	20K(MIN)

RESISTANCE READINGS

† MEASURED FROM PIN 7 OF V5
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections shown as bottom views.
3. Measured values are from socket-pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes posssible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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*TRADE MARK

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

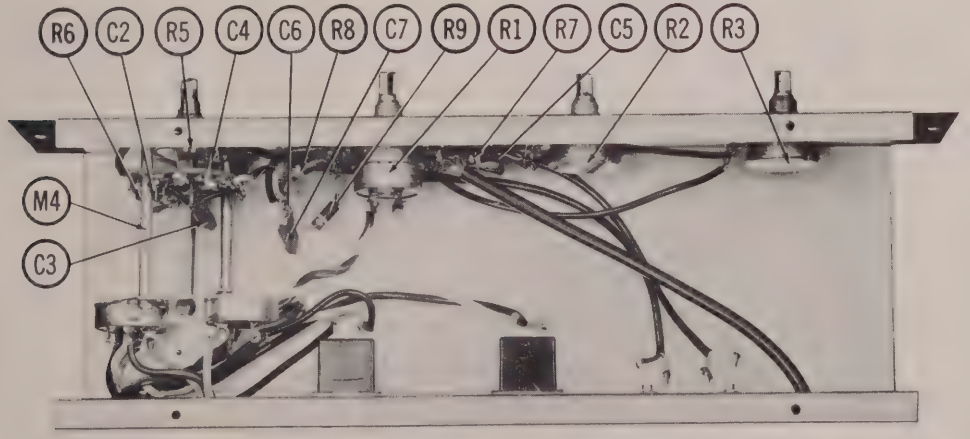
COLUMBIA RECORDS MODEL 532

COLUMBIA RECORDS
MODEL 532

COLUMBIA RECORDS
MODEL 532

TRADE NAME	Columbia Records Model 532
MANUFACTURER	Columbia Records, 799 Seventh Ave., New York 19, N.Y.
TYPE SET	AC Operated Phono Amplifier With 4 Speed Automatic Record Changer
TUBES (Five)	Types 12AU7 Preamplifier, 12AX7 AF Amp.-Phase Inv., (2) 6L6GT (or) 6V6GT Output, 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .58 Amp. @ 117 Volts AC (56 Watts Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE V-M MODEL 1200A - PHOTOFACT SET 353 FOLDER 16 ON RECORD CHANGER MANUAL RC-10.



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H515

SET 413 FOLDER 6

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Preamp.-Phase Inv.	12AU7	
V2	AF Amplifier	12AX7	
V3	Output	6L6GT	Note 1

ITEM No.	USE	TYPE	NOTES
V4	Output	6L6GT	Note 1
V5	Rectifier	6X4	

Note 1. Alternate type 6V6GT.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Columbia Records PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	450	11B725	AFH4-18-50	D0177.4	FP448	TMQ-123	Q-066	TVL-4773
B	■20	450							
C	▲20	450							
D	20	450							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Columbia Records PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C3	330			BPD-00033	DD-331	L10T33	UC-5333	5GA-T33	
C4	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C5	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C6	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	Note 1
C7	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	Note 1
C8	180			BPD-00018	DD-181	L10T18	UC-5318	5GA-T18	
C9	100			BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C10	.1	600		P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C11	.1	600		P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C12	.1	600		P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C13	1.5	200	11B726						

Note 1. Some versions may use 4000mmf in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Columbia Records PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	3meg	½	9B573					Loudness, Tap @ 1meg & 2meg
B	Switch							
R2A	3meg	½	9B575	B-84	A47-3meg-S	Q11-140	U59	Bass
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R3A	250K	½	9B574	B-51	A47-250K-Z	Q13-130	U44	Treble
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R4A	500Ω	½	9B572	AB-4	A47-500-S	B11-103	U2	D. E. P.
B	Shaft			AK-1	FKS-1/4	SK3	Not Req.	

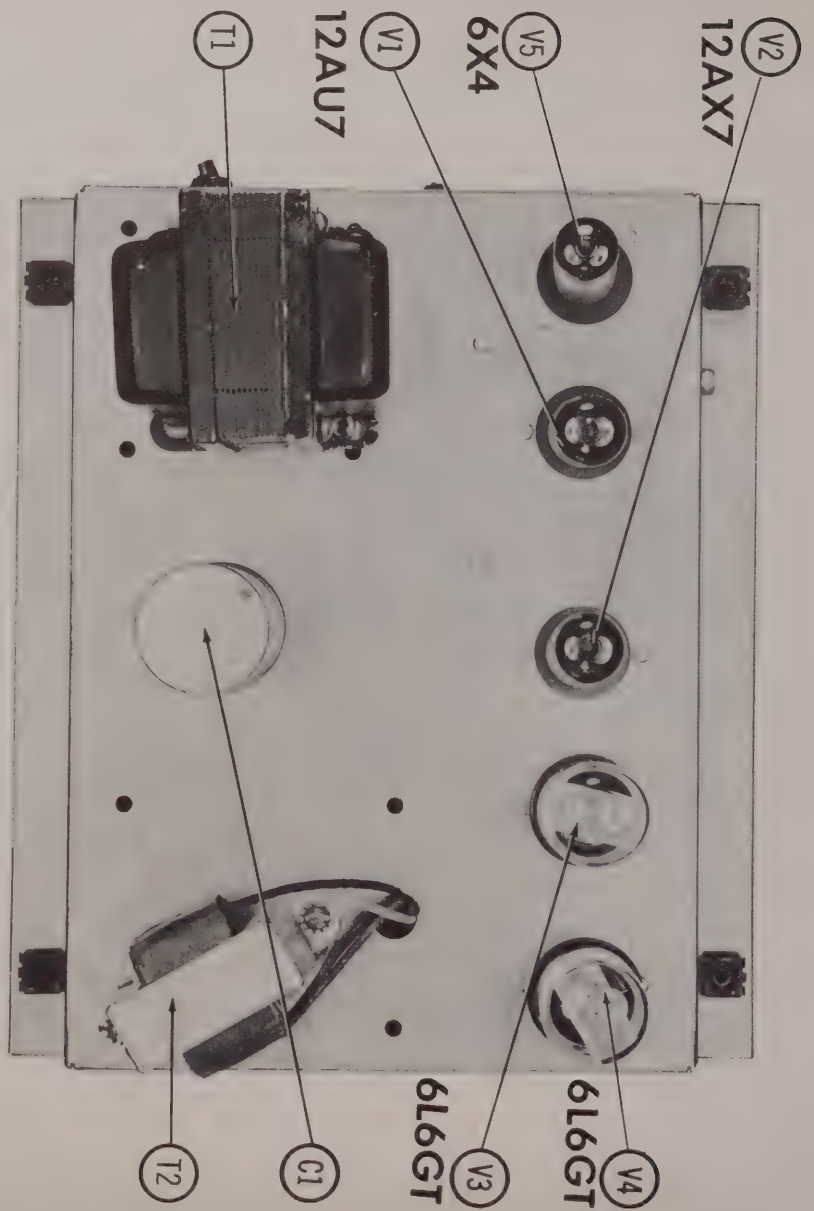
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Columbia Records PART No.	NOTES
	OHMS	WATT		
R5	270K			
R6	1meg			
R7	100K			
R8	100K			
R9	100K			
R10	10meg			
R11	100K			
R12	1000Ω			
R13	100Ω 5%			
R14	820Ω 5%			
R15	100K			
R16	470Ω			
R17	15K			

ITEM No.	RATING		Columbia Records PART No.	NOTES
	OHMS	WATT		
R18	1meg 5%			
R19	470K			
R20	2.2meg			
R21	100K			
R22	100K 5%			
R23	47K			
R24	470K			
R25	470K			
R26	8200Ω			
R27	220Ω			
R28	47Ω	1		
R29	12K	1		
R30	270Ω	5	16B414	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS

ITEM No.	USE	REPLACEMENT DATA					
		Columbia Records PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Crossover Choke	21B103					

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Columbia Records PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @.58A	630VCT @.080A	6.3V @2.1A	TR-131 ①	P9312	P3151		PC-8407	22R02 ③	R-9A ②

① Alternate Part #2B107. ② Drill new mounting holes. ③ Use original shields

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Columbia Records PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5100Ω CT	6-8Ω	TR-129 ①	Z1402			A-3852		S-55Z	① Alternate Part #3B221.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Columbia Records PART No.	QUAM PART No.	
SP1	10"	PM	6-8Ω	SP814 ①	10A4AZ8	① Alternate Part #1B124
SP2	3½"	PM	3-4Ω	1B125	3A07	
SP3	3½"	PM	3-4Ω	1B125	3A07	
SP4	3½"	PM	3-4Ω	1B125	3A07	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	Columbia Records PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT	
M1	TO-400-OV	118-TS	N8-1 & N8-3			

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	Columbia Records PART No.	JENSEN PART No.	WALCO PART No.	
M2	(78RPM)	†CRA-55 or ♦ CRA-55D	†W-64S or ♦W-64D	† Jewel ♦ Diamond
	(LP)	†CRA-55L or ♦CRA-55LPD	†W-64MGS or ♦W-64MGD	

MISCELLANEOUS

ITEM No.	PART NAME	Columbia Records PART No.	NOTES
M3 M4	Lamp Switch	19B591	#47 Compensation and On-Off (Rotary, wafer type)

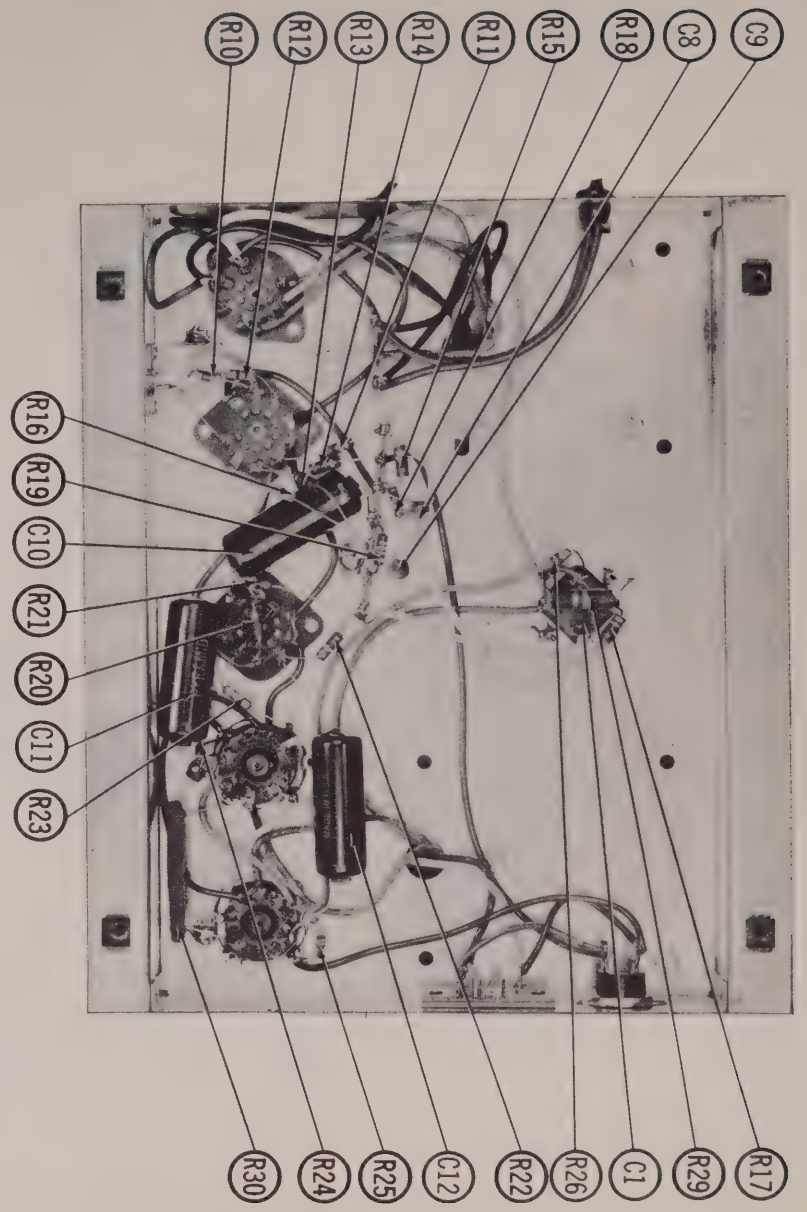
CABINETS & CABINET PARTS

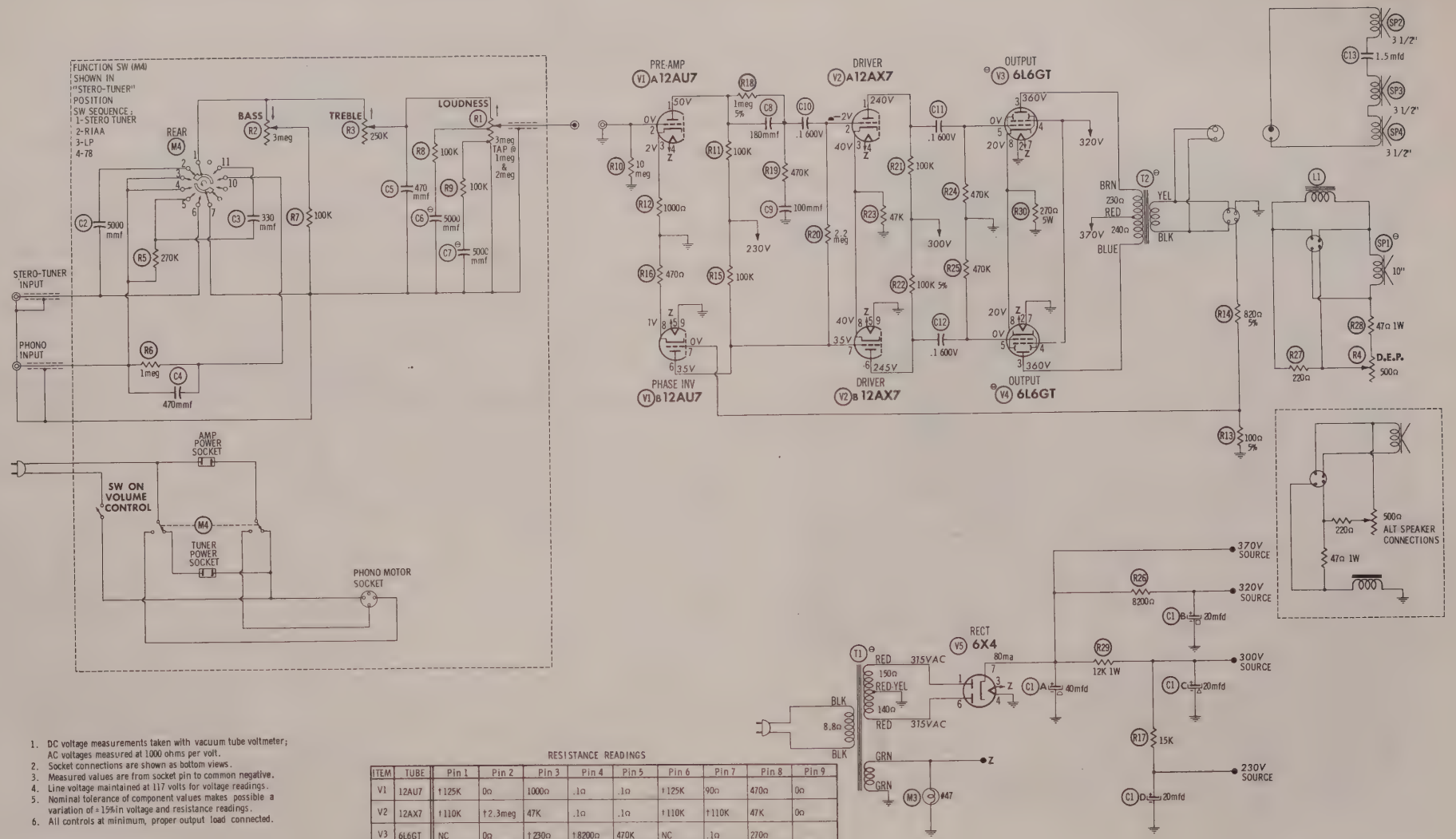
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—BOTTOM VIEW





1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

❸ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AU7	†125K	0Ω	1000Ω	.1Ω	.1Ω	†125K	90Ω	470Ω	0Ω
V2	12AX7	†110K	†2.3meg	47K	.1Ω	.1Ω	†110K	†110K	47K	0Ω
V3	6L6GT	NC	0Ω	†230Ω	†8200Ω	470K	NC	.1Ω	270Ω	
V4	6L6GT	NC	.1Ω	†240Ω	†8200Ω	470K	NC	0Ω	270Ω	
V5	6X4	150Ω	NC	.1Ω	0Ω	NC	140Ω	20K(Min)		

† MEASURED FROM PIN 7 OF V5.
▲ MEASURED FROM PIN 3 OF V2.
NC NO CONNECTION.

D. E. P. ADJUSTMENT (R4)

1. Disconnect speaker plug.
2. Connect 3 volts DC across pins 3 & 4.
3. Connect a DC milliammeter across pins 1 & 2.
4. Accurately adjust R4 for a zero meter reading.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

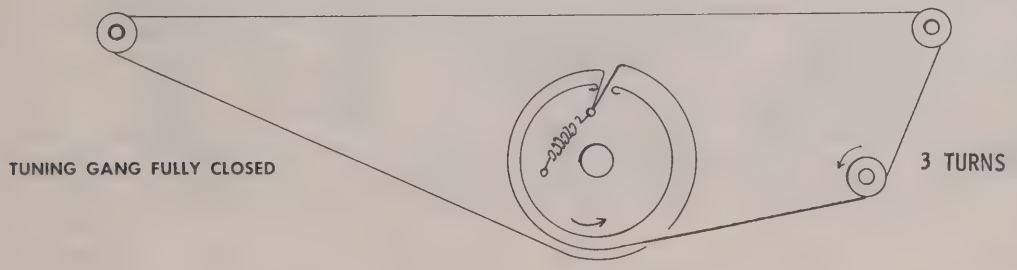
EMERSON
MODEL 886D (Ch. 120371B)

EMERSON
MODEL 886D (Ch. 120371B)

EMERSON
MODEL 886D (Ch. 120371B)

TRADE NAME	Emerson Model 886D (Ch. 120371B & FM-AM Tuner)		
MANUFACTURER	Emerson Radio & Phono Corp., 14th. & Coles Sts., Jersey City 2, N.J.		
TYPE SET	AC Operated FM-AM Tuner, Preamplifier, Amplifier and 4 Speed Automatic Record Changer		
TUBES	Twelve		
POWER SUPPLY	105-125 Volts AC -60 Cycles	RATING	Tuner:.3Amp. @ 117 Volts AC (27 Watts) Amp.: .38Amp., @ 117 Volts AC (43 Watts Less motor)
TUNING RANGE-BROADCAST	535-1650KC	FREQ. MOD	88-108MC

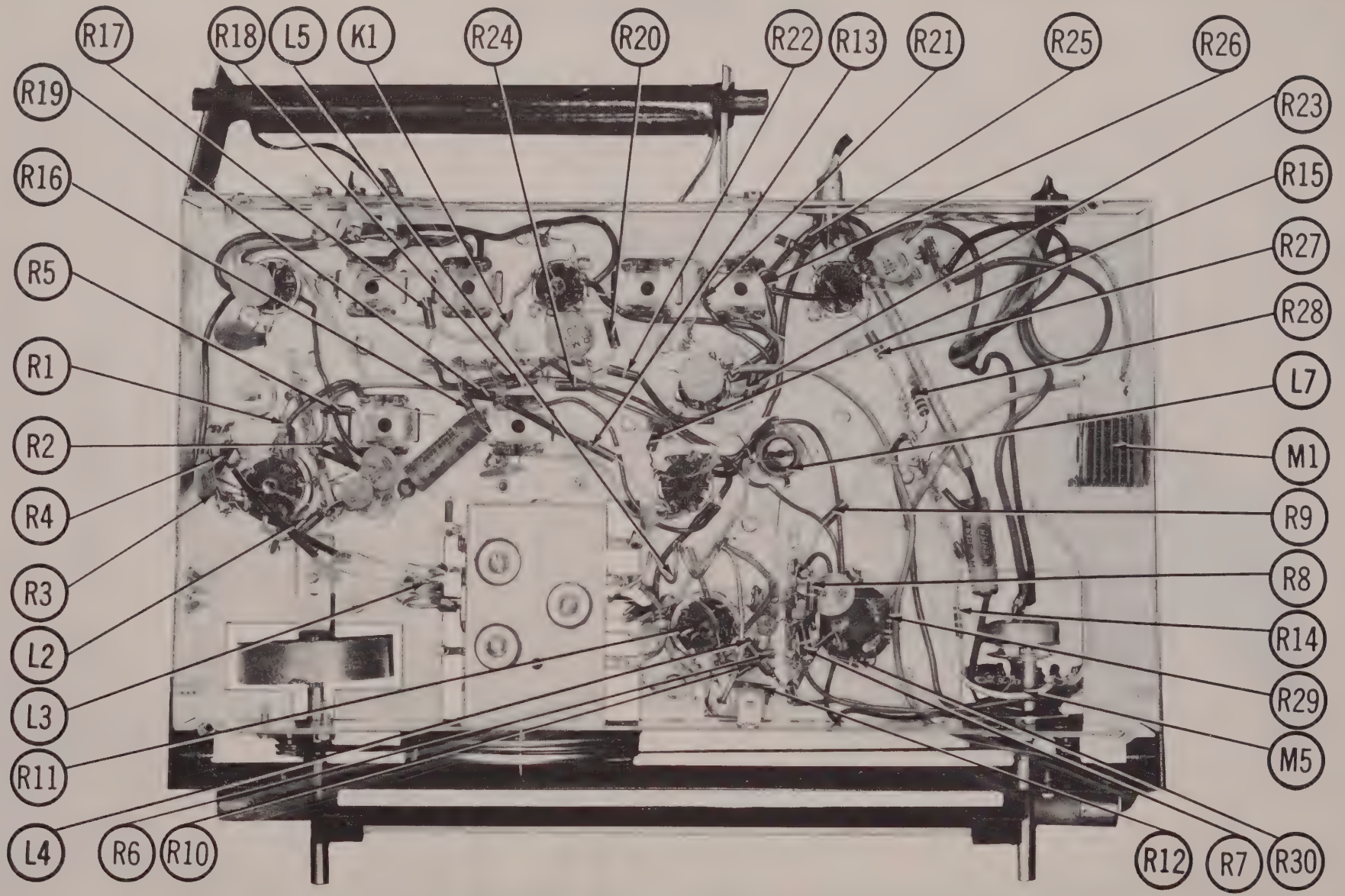
FOR SERVICE INFORMATION ON RECORD CHANGER — SEE SIMILAR V-M Model 1200A - PHOTOFACT SET 353 FOLDER 16 OR RECORD CHANGER MANUAL RC-10.



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana . Printed in U.S. of America



TUNER CHASSIS BOTTOM VIEW - RESISTOR, INDUCTOR, & MISC IDENT.

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM RF Amp. -FM Mixer	6U8	
V2	FM AFC-FM Osc.	12AT7	
V3	AM Converter	6BE6	

ITEM No.	USE	TYPE	NOTES
V4	1st FM-AM IF Amp	6BA6	
V5	2nd FM IF Amp-AM Det.-AVC	6AU6	
V6	FM Limiter	6AU6	
V7	Discriminator	6AL5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲ 40	200	962202		C0150	FP320	TMT-19	T-085	R2677*
B	■ 40	200			BR3025	TC55	TD-30-250	MT-4530	
C	▲ 20	200							

* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	EMERSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	100			N750-DI 100	DTN-100	C10T1U	NT-531	5 TCU-T1	N750
C3	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C4	10000			BPD-01	DD-103	BYA10S1	DC511	5 HK-S1	
C5	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C6	220			BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C7	100			N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C8	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C9	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C10	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C11	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C12	10			N750-DI 10	DTN-10	C10Q1U	NT-541	5TCU-Q1	N750
C13	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C14	100			N750-DI100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C15	68			NP0-DI68	DTZ-68	C10Q68C		5TCC-Q68	NP0
C16	2. 2			NP0-S12. 2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C17			962201						
C18	910								
C19	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C20	. 05	200		P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C21	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C22	47			N750-DI47	DTZ-47	C10Q47U	NT-5447	5TCU-Q47	N750
C23	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C24	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C25	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C26	47			BPD-000047	DD-470	L10Q47	UC-5447	5GA-Q47	
C27	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C28	100			N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C29	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C30	470			BPD-00047	DD-471	BYA10T47	UC-5347	5GA-T47	
C31	330			BPD-00033	DD-331	L10T33	UC-5333	5GA-T33	
C32	. 05	200		P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R1	270K			
R2	220Ω			
R3	68Ω			
R4	2. 2meg			
R5	15K			
R6	100Ω			
R7	470K			
R8	47K			
R9	1meg			
R10	560Ω			

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R11	22K			
R12	10K	1		
R13	2. 2meg			
R14	3900Ω			
R15	22K			
R16	1meg			
R17	1000Ω			
R18	220K			
R19	2. 2meg			
R20	1000Ω			

TUNER PARTS LIST & DESCRIPTION (continued)

RESISTORS (cont)

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R21	100K			
R22	10K			
R23	15K			
R24	1000Ω			
R25	100K			

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R26	100K			
R27	33K			
R28	33K			
R29	390Ω			
R30	390Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		EMERSON PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Trans.	962192					
L2	RF Choke	962194		SW-631*			4. 7 Microhenries; wound on 10K.
L3	FM RF Coil	962193					
L4	RF Choke		19-1002	BC-563	4606		2. 7 Microhenries
L5	FM Osc. Coil	962190					
L6	Loop Stick	962196					
L7	AM Osc. Coil	962191					
L8	1st FM IF	962198	16-3487	FM-254	1463		
L9	1st AM IF	962197	16-6758	BC-352	12-C1	RF-1	
L10	2nd FM IF	962198	16-3487	FM-254	1463		
L11	2nd AM IF	962197	16-6758	BC-353	12-C2	RF-2	
L12	3rd FM IF	962198	16-3487	FM-254	1463		
L13	Discriminator		17-3494	FM-253	1464		

* Parallel with a 10K Resistor.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	EMERSON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .30A	105V @ .037A	6. 3V @ 2. 5A	962200				PA8421		

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	EMERSON PART No.	REPLACEMENT DATA	
K1	Diode RF Filter	100mmf, 100mmf, 47K,	962204	Aerovox Centralab Cornell-Dubilier Sprague	PA-97 PC-50 1I1TM1 D-1

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	EMERSON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.037A	962205	1234AH	RS065	65	

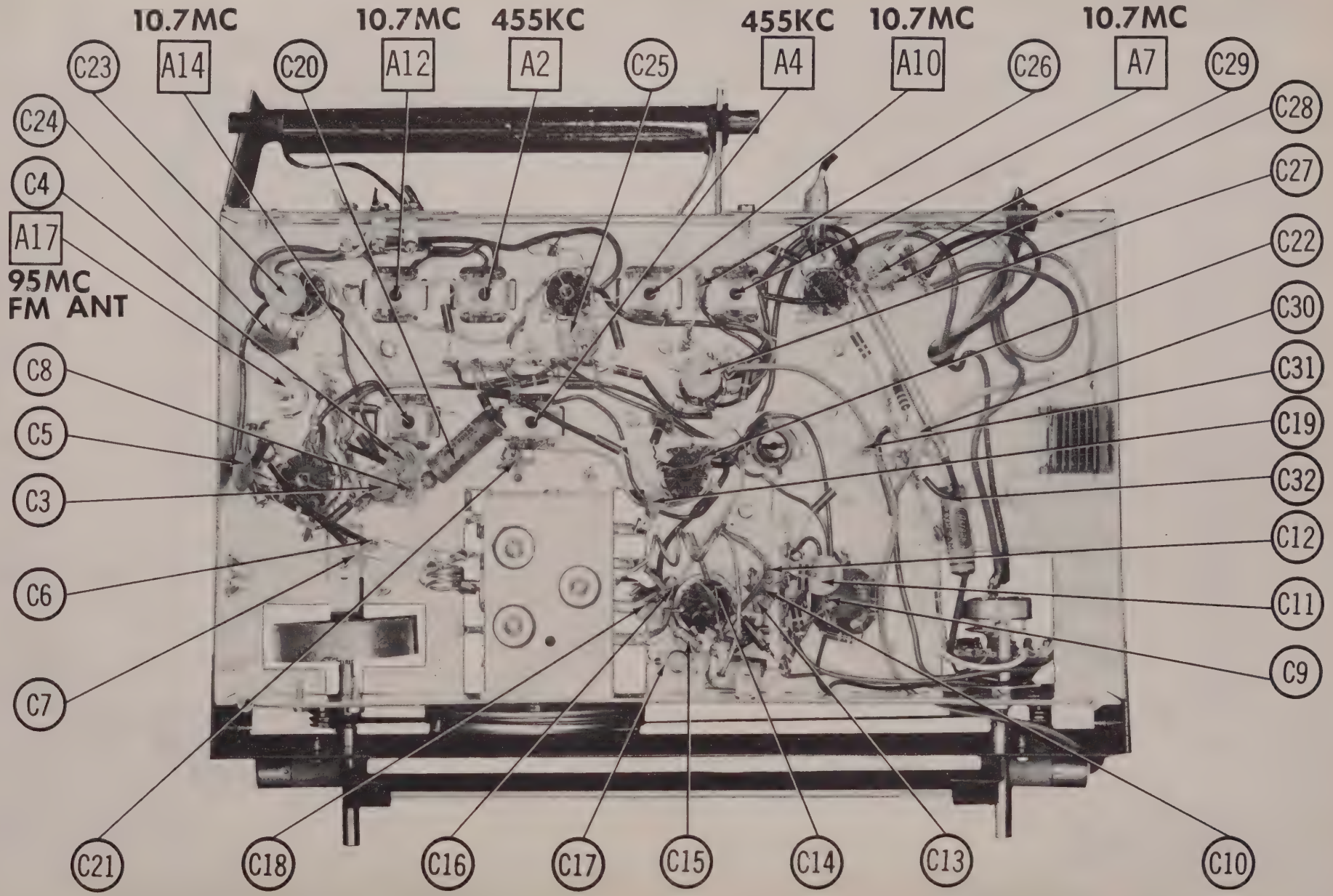
MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M2	Lamp	807000	#47
M3	Lamp	807000	#47
M4	Tuning Cap.	962203	4 gang (AM Sections: Ant. 42-261mmf, Osc. 18-126mmf)
M5	Switch	962206	Function & Power, Rotary Wafer Type

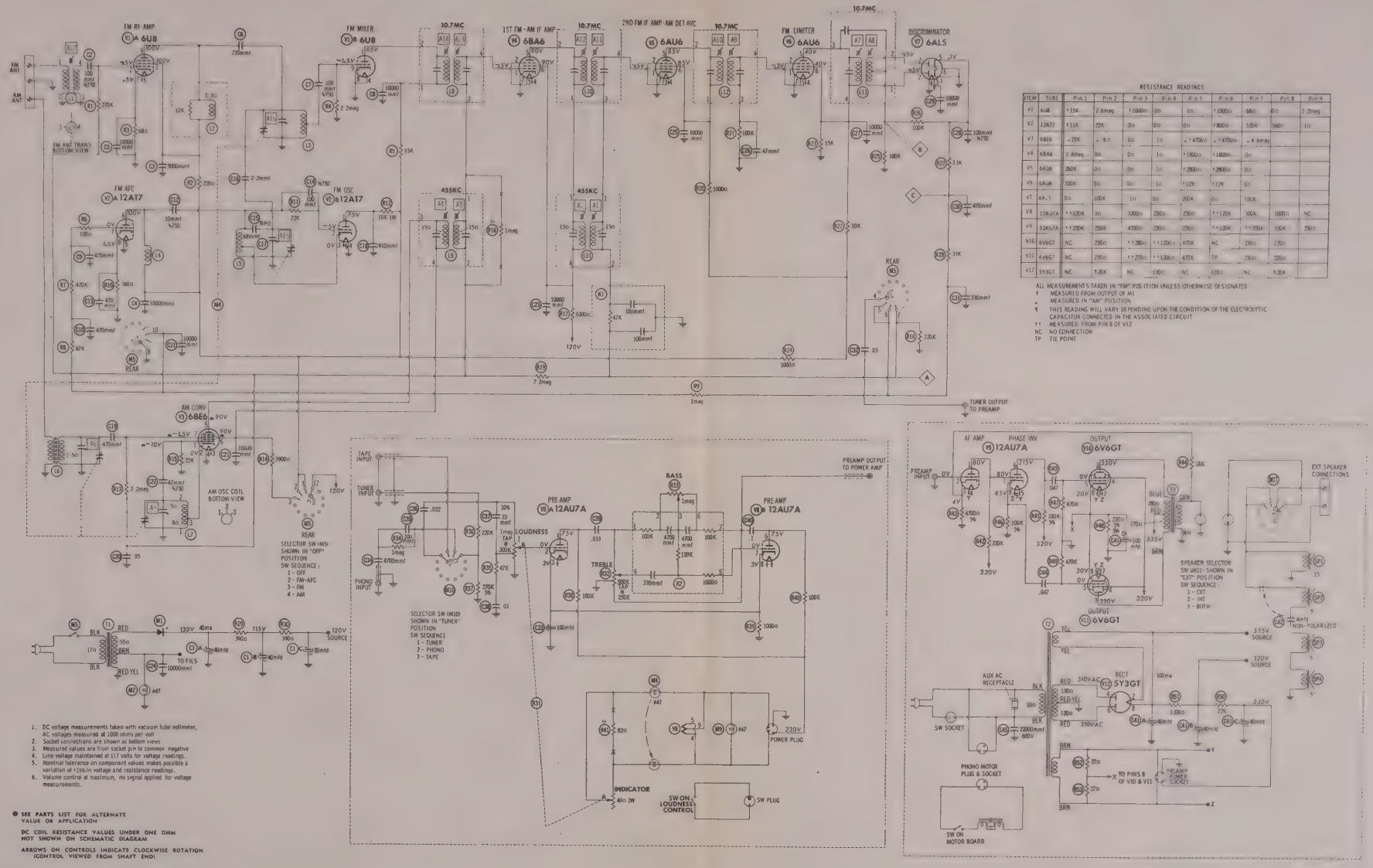
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



TUNER CHASSIS-BOTTOM VIEW -CAPACITOR AND ALIGNMENT IDENTIFICATION



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6U8	†15K	2.6meg	†1000Ω	0Ω	1Ω	†1000Ω	68Ω	0Ω	2.2meg
V2	12AT7	†11K	22K	0Ω	0Ω	0Ω	†800Ω	530K	560Ω	1Ω
V3	6BE6	¶22K	∞ Ω	0Ω	1Ω	¶4700Ω	†4700Ω	∞ 4.6meg		
V4	6BA6	2.4meg	0Ω	0Ω	1Ω	†180Ω	†180Ω	0Ω		
V5	6AU6	260K	0Ω	0Ω	1Ω	†280Ω	†280Ω	0Ω		
V6	6AU6	100K	0Ω	0Ω	1Ω	†12K	†12K	0Ω		
V7	6AL5	0Ω	100K	1Ω	0Ω	200K	0Ω	130K		
V8	12AU7A	††120K	0Ω	1000Ω	230Ω	230Ω	††120K	100K	1000Ω	NC
V9	12AU7A	††250K	250K	4700Ω	230Ω	230Ω	††120K	††250K	100K	230Ω
V10	6V6GT	NC	230Ω	††280Ω	††1200Ω	470K	NC	230Ω	230Ω	
V11	6V6GT	NC	230Ω	††270Ω	††1200Ω	470K	TP	230Ω	230Ω	
V12	5Y3GT	NC	1.2K	NC	130Ω	NC	120Ω	NC	1.2K	

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM OUTPUT OF M1
- MEASURED IN "AM" POSITION
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT
†† MEASURED FROM PIN 8 OF V12
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of +15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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413-7

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01mfd	High side to AM antenna stator lug of tuning gang. Low side to chassis.	455KC (400∿ Mod)	AM	Tuning gang fully closed.	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4	Adjust for maximum deflection.
2.		Loop	1650KC	"	1650KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	"	Tune to 1400KC signal	"	A6	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR & VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.01mfd	High side to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (Unmod)	FM (AFC Off)	Point of non-interference	DC probe to point Ⓑ. Common to chassis.	A7	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	.001mfd	High side to FM RF stator lug of tuning gang. Low side to chassis.	"	"	"	DC probe to point Ⓑ. Common to chassis.	A9, A10, A11, A12, A13, A14	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.01mfd	High side to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓑ. Low side to chassis.	A7	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A8	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.
6.	.001mfd	High side to FM RF stator lug of tuning gang. Low side to chassis.	"	"	"	Vert. Amp. to point Ⓑ. Low side to chassis.	A9, A10, A11, A12, A13, A14	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.

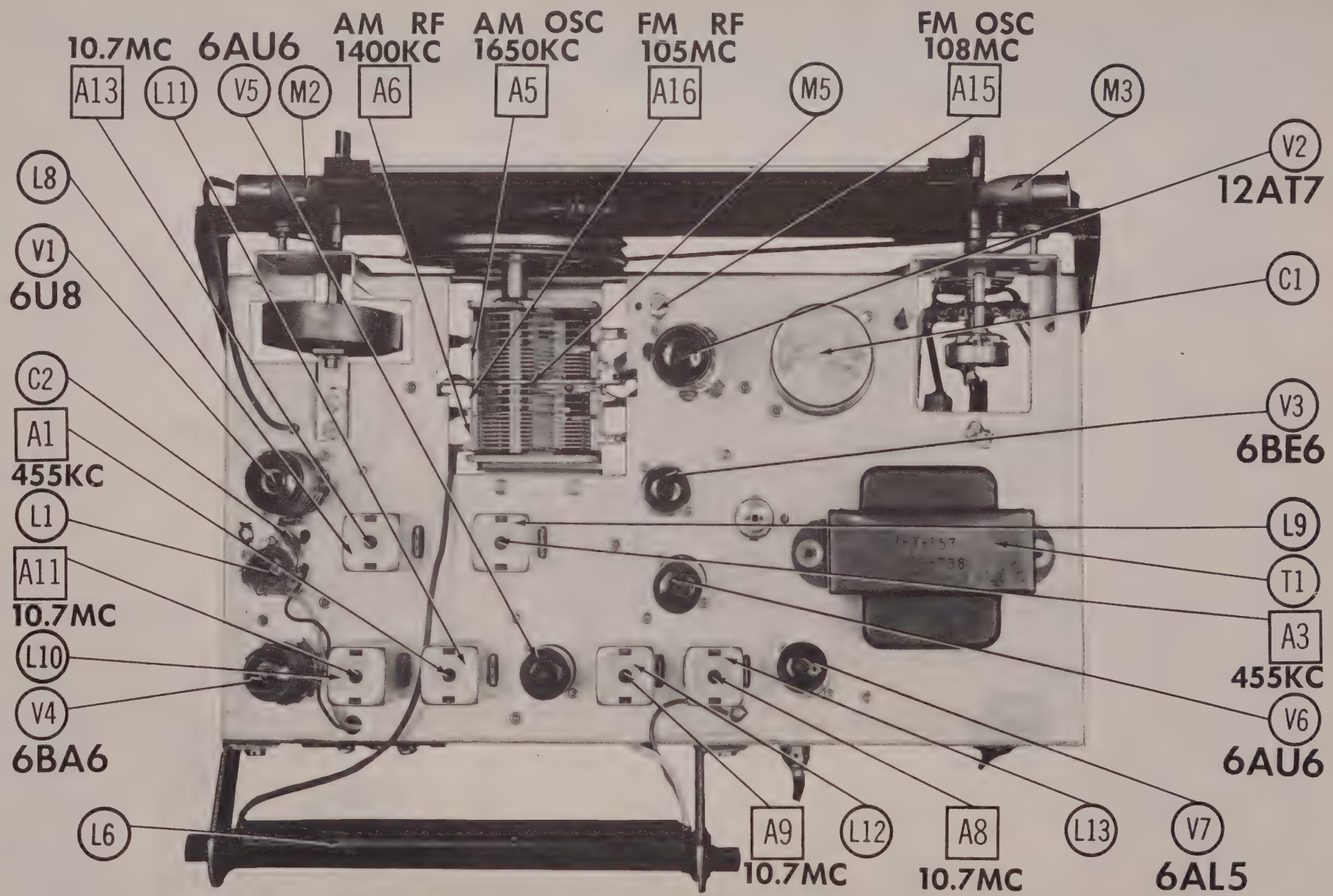
FM RF ALIGNMENT

Chassis bottom plate should be installed.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	Two 150Ω Carbon Resistors	To FM Antenna terminals with 150Ω in each lead.	108MC	FM	108MC	DC probe to point Ⓑ. Common to chassis.	A15	Adjust for maximum deflection.
8.	"	"	105MC	"	Tune to 105MC signal	"	A16	"
9.	"	"	95MC	"	Tune to 95MC signal	"	A17	"

FIG. 1

FIG. 2



TUNER CHASSIS TOP VIEW

PREAMP PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V8	Preamplifier	12AU7 A	

ITEM No.	USE	TYPE	NOTES

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C33	100	15	925418	PRS15V100	BBR100-15	TC2501	TD-100-15	MTH-1510	TVA-1160

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	EMERSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C34	4700		928922	BPD-0047	DD-472	BYA10D47	UC-5247	5HK-D47	
C35	100		928912	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C36	. 022	400	923524	P488N-022	DD-203	CUB4S22	GEM-4122	4TM-S22	
C37	33		228894	NP0-D133	DD-330	L10Q33	ZT-5433	5TCC-Q33	
C38	. 01	200	923314	P288N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C39	. 033	400	923534	P488N-033		CUB6S33	GEM-4133	6TM-S33	
C40	. 1	400	923515	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	EMERSON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R31A	40Ω	2(WW)	390493					Indicator
B	1meg	½						Loudness, Tap@300K
C	Switch							Power On-Off
R32A	500K	½	390492	BT-64	A47F5-500K	Q19-133X	UT-431	Treble, Tap@250K
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R33A	1meg	½	390491	B-70	A47-1meg-Z	Q13-137	U53	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R34	1meg		351212	
R35	47K		350892	
R36	220K		341052	
R37	270K 5%		341072	

ITEM No.	RATING		EMERSON PART No.	NOTES
	OHMS	WATT		
R38	100K		350972	
R39	1000Ω		340492	
R40	100K		350972	
R41	82Ω			Note 1.

Note 1. Not used in some versions.

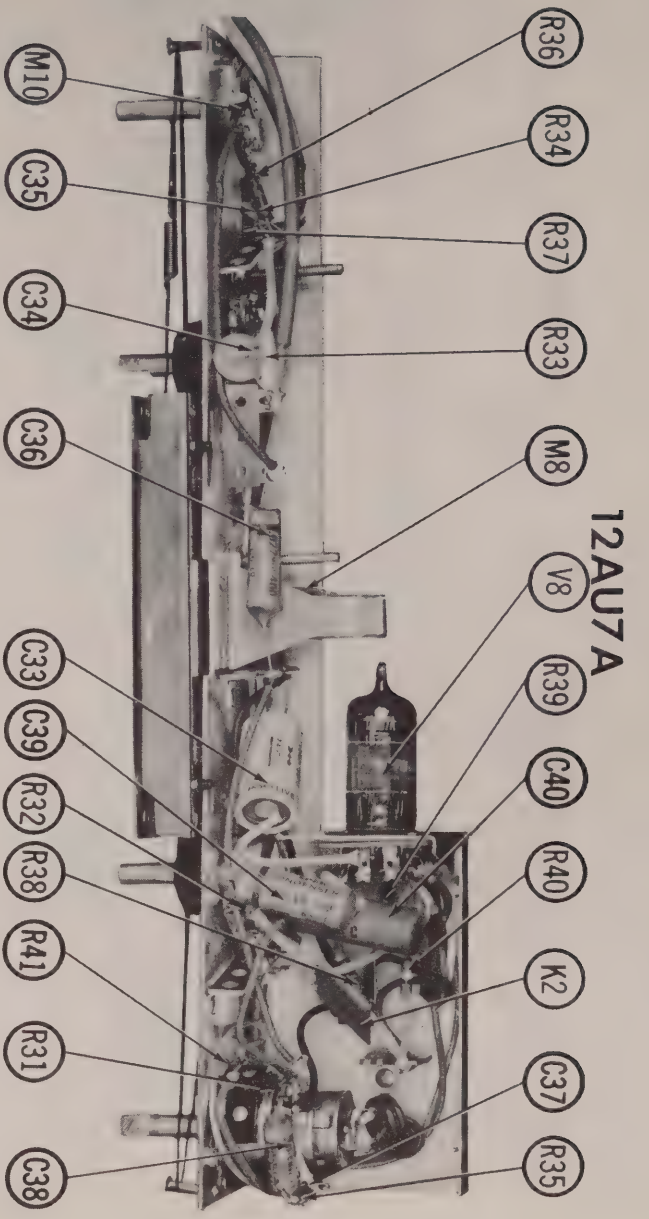
COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	EMERSON PART No.	REPLACEMENT DATA
K2	Tone Comp.	330mmf, 4700mmf, 4700mmf, 1000Ω, 100K, 100K, 120K	923043	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	EMERSON PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT	
M6	962136	81-TB		56	*PT-2	* Not required unless original mounting mechanism is damaged.

PREAMP CHASSIS



PREAMP PARTS LIST AND DESCRIPTIONS (Cont)

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	EMERSON PART No.	JENSEN PART No.	WALCO PART No.	
M7				

MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M8	Lamp	807000	#47, Loudness
M9	Lamp	807000	#47, Record Compartment
M10	Switch	510127	Selector, Rotary Wafer Type

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type) ..... Use BELDEN No. 8874
Low-Loss Shielded Lead (Interconnecting) ..... Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

AMP PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V9	AF Amp. -Phase Inv.	12AU7 A	
V10	Output	6V6GT	

ITEM No.	USE	TYPE	NOTES
V11	Output	6V6GT	
V12	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	EMERSON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C41A	◓ 40	400	925417	AFH4-57-75	D0660	FP421.8	TMQ-100	Q-415	TVL-4670.5
B	■ 40	400			BR3045		TD-30-450	MT-4530	
C	▲ 40	400							
D	100	50							
C42	4	15NP	925391	NP-PRS50V4	BBR8-150 † BBR8-150 †	TC41 † TC41 †	TD-8-150 † TD-8-150 †	MT-1508 † MT-1508 †	R2444*

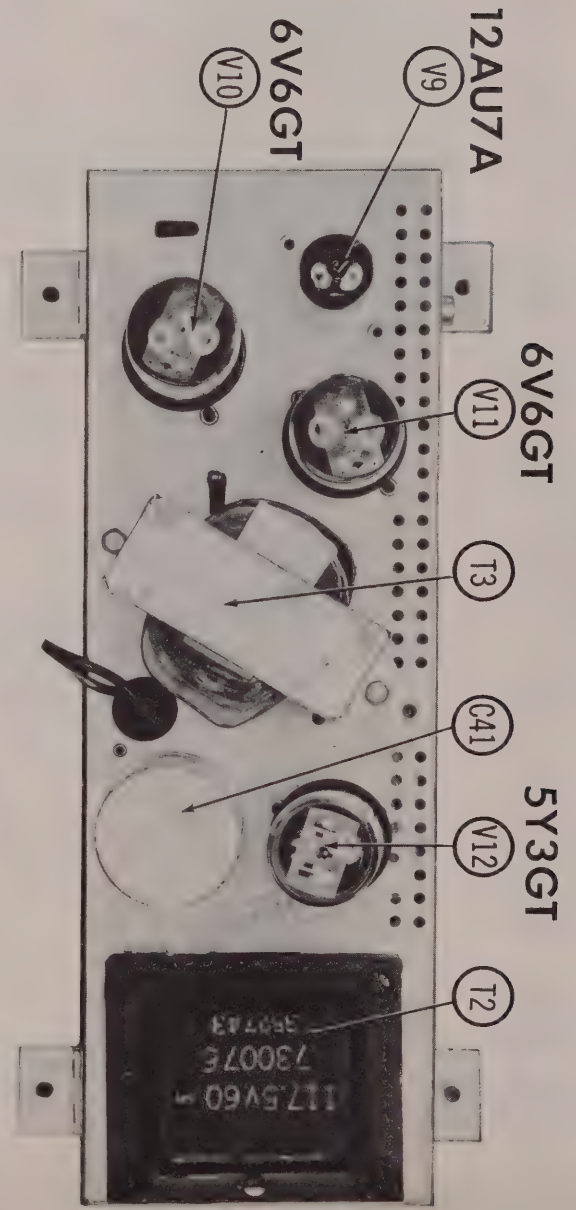
† Connect Negative Leads Together
* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	EMERSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C43	.047	400	924554	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C44	.047	400	924554	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C45	22000	600	922209		DD-203				

AMP CHASSIS—TOP VIEW



AMP PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	EMERSON PART No.	NOTES
R42	220K		341052	
R43	4700Ω 5%		330652	
R44	18K		340792	
R45	100K 5%		330972	
R46	100K 5%		330972	
R47	470K		341132	
R48	220Ω 5%	5(WW)	394199	
R49	470K		341132	
R50	22K		350812	
R51	1200Ω		340512	
R52	27Ω		340112	
R53	27Ω		340112	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA EMERSON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117VAC @ .68A	600VCT @ .100A	5VAC @ 2A	730076						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @1.8A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA EMERSON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T3	6500Ω CT	6-8Ω	734156	Z1013	A2905	AU-606①	A-3800	24S55①	S-55X①	①Drill New Mounting Hole.

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA EMERSON PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	15"	PM	6-8Ω	180178	15A10L	
SP2	5"	PM	2-3Ω	180177	5A15Z2.5	
SP3	5"	PM	2-3Ω	180177	5A15Z2.5	
SP4	5"	PM	2-3Ω	180177	5A15Z2.5	

MISCELLANEOUS

ITEM No.	PART NAME	EMERSON PART No.	NOTES
M11	Switch	510128	Speaker Selector, Rotary Wafer Type

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

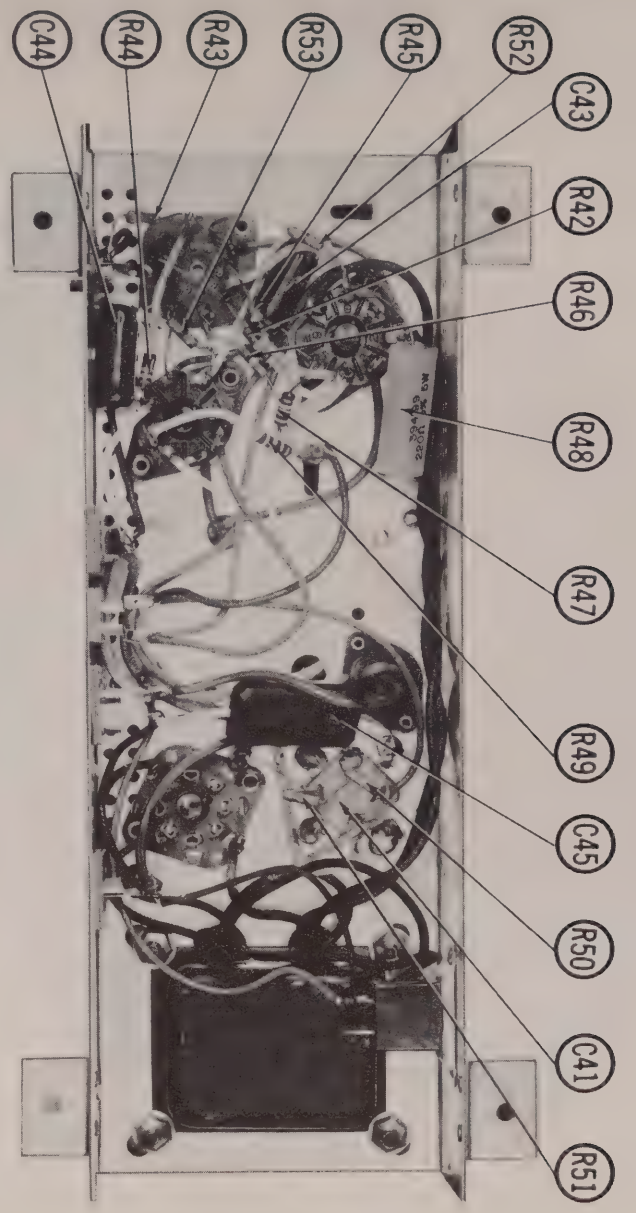
NAME	PART NO.	DESCRIPTION
Knob	961842	Changer
Pointer	525075	Red
Pointer	525076	Green
Pointer	962212	Dial
Dial	460915	Window, (Amplifier)
Glass	962213	Dial Scale (Tuner)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

AMP CHASSIS—BOTTOM VIEW



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EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

FAIRCHILD MODEL 412-4

FAIRCHILD MODEL 412-4

FAIRCHILD MODEL 412-4

GENERAL INFORMATION

Fairchild Model 412-4 consist of two basic units: Model 412-1 single-speed turntable, and Model 412-ED electronic control regulator.

The Model 412-4 electronic drive turntable features a four-speed electronic control regulator, thus eliminating any type of mechanical speed selection. Speed of the hysteresis-synchronous motor is also controlled by the electronic control regulator.

The Model 412-4 plays 16 2/3-, 33 1/3-, 45-, and 78-rpm records by turning the speed selector switch to desired position.

The Model 412-4 operates on 50, 60, or 400 cycles and on line voltages from 90 to 135 volts AC without overheating, running slowly, or wow. It may be operated from storage batteries by using a vibrator, or from other direct current sources by using an inverter.

Manufactured by:

Fairchild Recording Equipment Company
10-40 45th Avenue
Long Island City 1, New York

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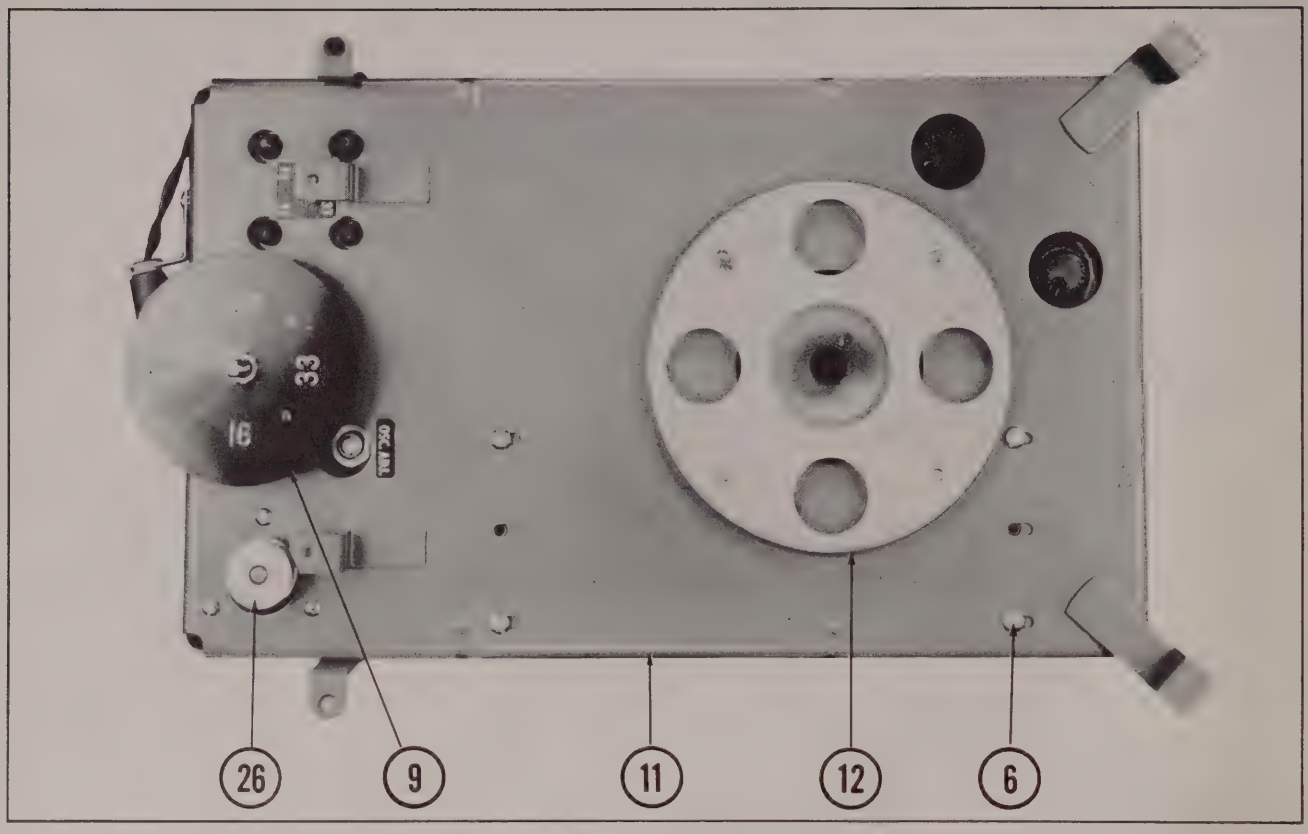


FIG. 1 BASEPLATE WITH TURNTABLE REMOVED

SPECIFICATIONS

Power Consumption:

110 watts

Turntable Speeds:

16 2/3, 33 1/3, 45, and 78 rpm

Rumble:

Better than 41 db below a reference of 1.4 centimeters per second; peak velocity at 100 cps.

Wow:

Less than ± .1% of rated speed

Over-all Size:

Height, 8 1/4"; width, 12 5/8"; length, 17 3/8".

Weight:

35 1/2 lbs.

OPERATION

Turn toggle switch to "On" position. This energizes the turntable motor and the lamp illuminating the speed control.

Thirty seconds are required for unit to reach full operating condition. Rotate speed selector dial (9) in either direction to select playing speed.

When speed selector switch is turned to an intermediate position, the circuit is left in idling condition with heaters on and all other power off.

Each speed can be varied upward or downward 3% by means of vernier speed controls under black dress plate (5) and are accessible after removing speed selector knob (3) and dress plate (5).

To play 45-rpm records, raise center spindle (1) until it snaps into position. For all others, spindle should be flush with record pad.

The turntable may be used as a single 33 1/3 unit in case of tube failure or if electronic regulator must be removed for repairs. To operate as a single unit, remove power cord from outlet, remove electronic control regulator plug and insert shorting plug in its place, and reconnect to power outlet. Unit now operates normally for 33 1/3-rpm records.

ADJUSTMENTS

Speed may be adjusted by placing a stroboscope on turntable, turning speed selector switch to speed to be adjusted, and varying the vernier control until turntable speed and dots on stroboscope are synchronized.

This procedure can be repeated for each of the remaining speed adjustments.

Use stroboscope under a fluorescent or neon light operating on 60 cycles.

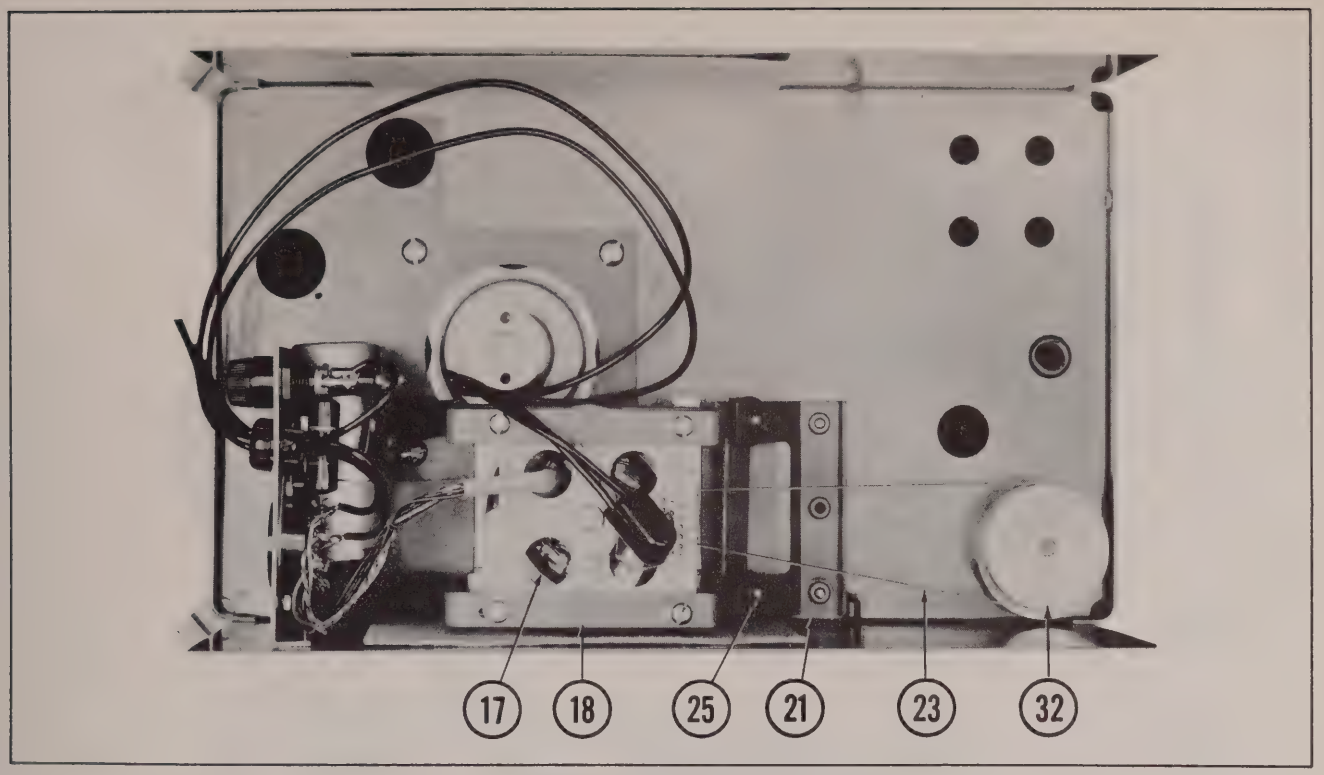


FIG. 2 BOTTOM VIEW OF BASEPLATE

Belts

To adjust tension of drive belts (8) and (23):

1. Loosen screws (13) locking idler pulley assembly (33) in place.
2. Move assembly in direction that produces desired belt tension.
3. While idler continues running, and if turntable can be held still by hand with both drive belts (8) and (23) remaining in center of their pulleys, belt tension will be correct.
4. Lock idler pulley assembly (33) in place by tightening screws (13).

MAINTENANCE

Cleaning Lucite Window

Use absorbent cotton dipped in a solution made by dissolving 1/2 teaspoon detergent in a gallon of water. Do not rinse with clear water. Allow to air dry.

Lubrication

If the unit is operated continuously, main bearing (7) and Teflon sleeve bearing (29) should be lubricated once or twice a year with a noncorrosive oil. Main bearing is lubricated through a hole under the spindle; five to ten drops should be sufficient. One to two drops of oil should be sufficient on sleeve bearing.

MECHANICAL PARTS LIST

Ref. No.	Description
1	Spindle
2	Turntable
3	Speed Selector Knob
4	Dress Plate Mounting Screws
5	Dress Plate
6	Motor Bracket Mounting Screws
7	Main Bearing
8	Turntable Drive Belt
9	Speed Selector Dial
10	Set Screw
11	Base Plate
12	Turntable Shaft Well
13	Eccentric Pulley Shaft Mounting Screws
14	Motor Mounting Bracket (Right)
15	Spherical Vibration Mount
16	Turntable Pad
17	Motor

Ref. No.	Description
18	Motor Mounting Brackets
19	Motor Mounting Screws
20	Motor Shield
21	Motor Mounting Bracket (Left)
22	Motor Mounting Bracket
23	Drive Belt
24	Washer
25	Screw
26	Pulley
27	Washer
28	Washer
29	Teflon Sleeve Bearing
30	Eccentric
31	Pulley & Eccentric Mounting Cap
32	Pulley
33	Idler Pulley Ass'y.

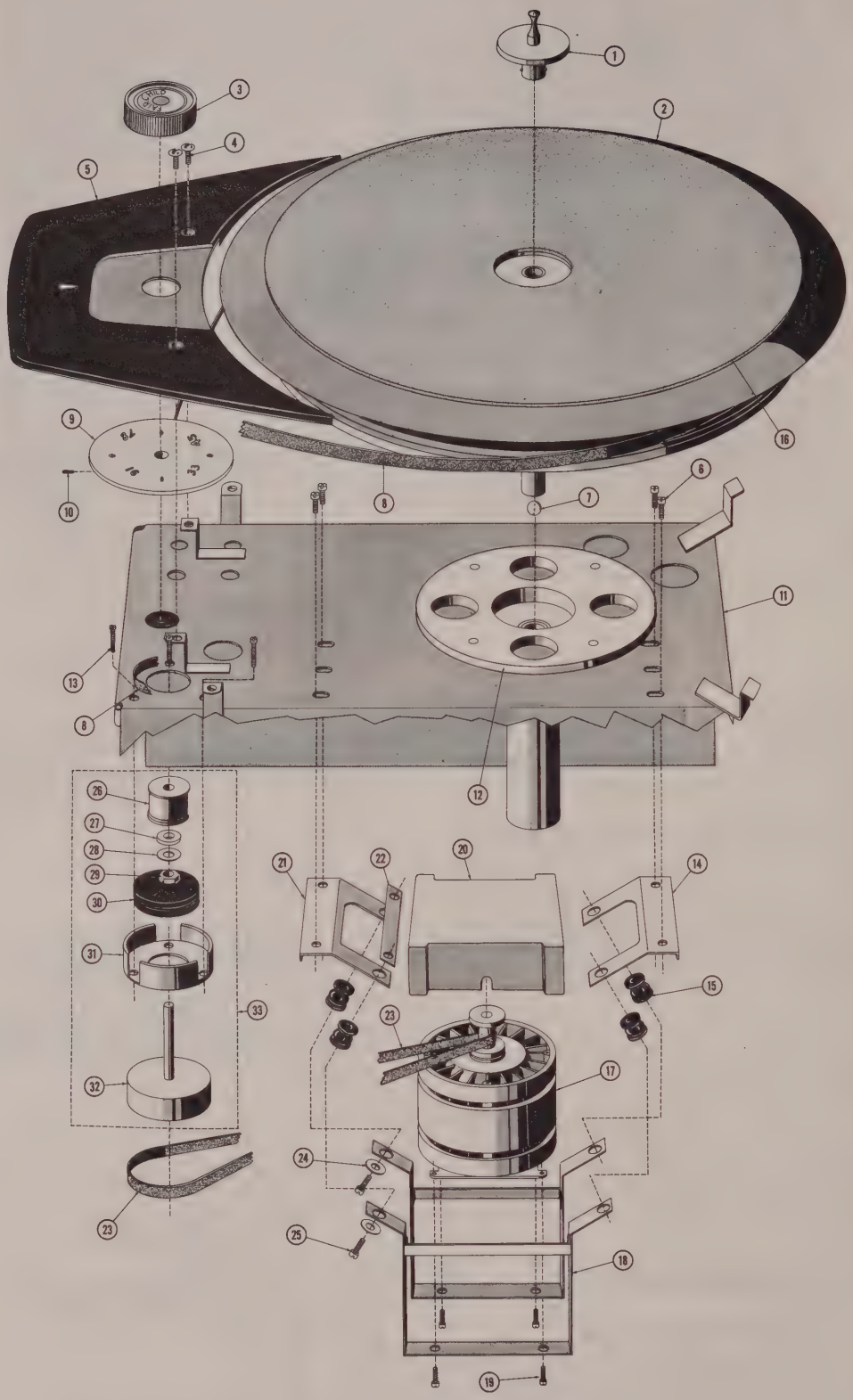


FIG. 3 EXPLODED VIEW OF TURNTABLE

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Motor Drive Osc.	12BH7	
V2	Motor Drive Signal Amp.	12AX7	
V3	Motor Signal Driver	12BH7	
V4	Motor Drive Output	25BQ6GA	Note 1.
V5	Motor Drive Output	25BQ6GA	Note 1.
V6	Voltage Regulator	OA2	

Note 1. Alternate Type 25DQ6

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	FAIRCHILD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	40	250		AFH1-29	XA0291	FP146	TMS-31	S-140	TVL-1519
C2	120	450		AFH1-55-25	A0514	FP242.5	TMD-58	S-290	TVL-1760
C3	4	250		PRS250V4	BBR4-250	TC50X	TD-4-450	MT-4504	TVA-1501
C4	40	450		PRS450V40	BR4045	TC78	TD-40-450	MT-4540	TVA-1712
C5	4	236AC		RY-666	KGL3040	RP-3304		7533-4	OP-1405
C6	20	150		PRS150V20	BBR20-150	TC45	TD-20-150	MT-1520	TVA-1410

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

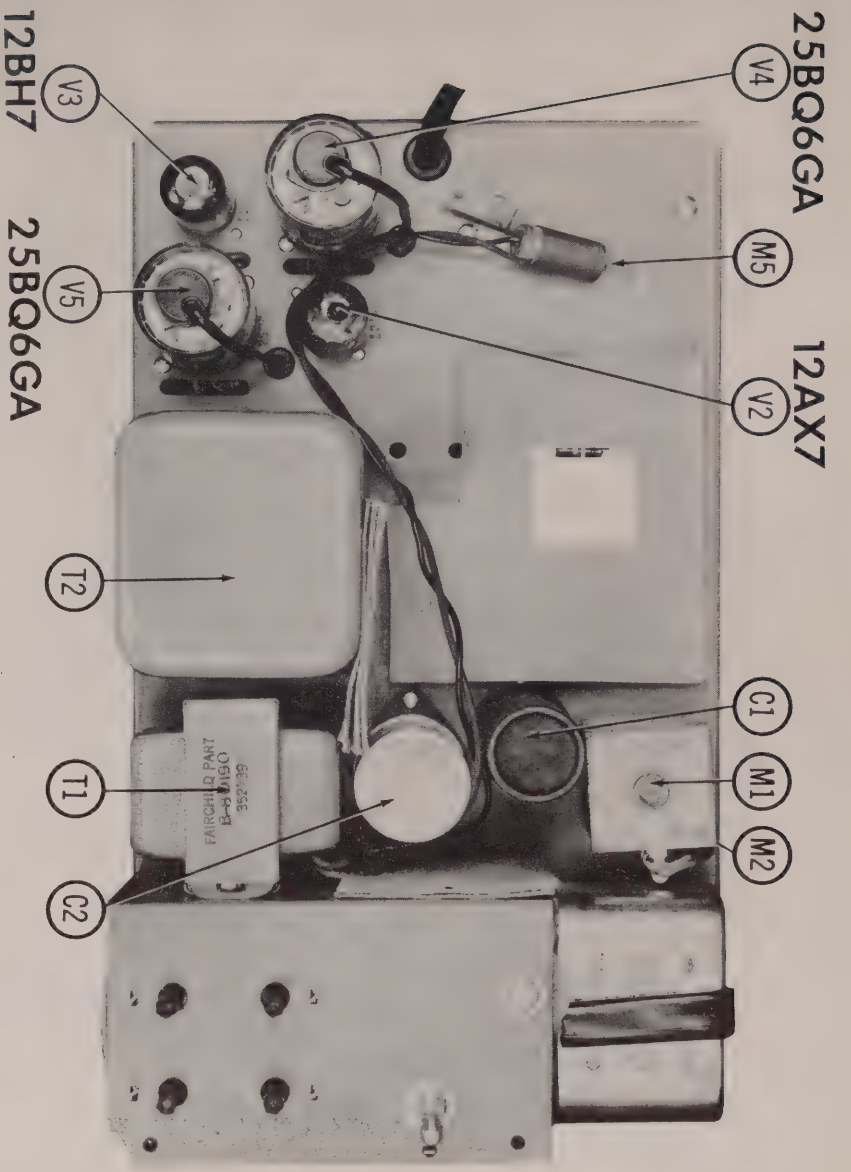
ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	FAIRCHILD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7	485								10%
C8	840								10%
C9	1100			1469-0011		1R5D11		MS-211	Note 1 10%
C10	50			NP0-D150	DD-500	L10Q5	ZT-545	5TCC-Q5	Note 1 10%
C11	2250								Note 2 10%
C12	50			NP0-D150	DD-500	L10Q5	ZT-545	5TCC-Q5	Note 2 10%
C13	.25	200					GEM-2025		10%
C14	485								10%
C15	840								10%
C16	1100			1469-0011		1R5D11		MS-211	Note 3 10%
C17	50			NP0-D150	DD-500	L10Q5	ZT-545	5TCC-Q5	Note 3 10%
C18	2250								Note 4 10%
C19	50			NP0-D150	DD-500	L10Q5	ZT-545	5TCC-Q5	Note 4 10%
C20	.01	400					GEM-1611		10%
C21	.1	600							10%
C22	.01	400					GEM-1611		10%
C23	.1	600							10%
C24	.01	400					GEM-1611		10%
C25	.05	600							10%
C26	.01	400					GEM-1611		10%
C27	.2	550VAC							10%
C28A	.2	550VAC							10%
B	.6	330VAC							10%
C	1.5	330VAC							10%
C29	.047	400							10%
C30	.012	600							10%

Note 1. When C9 is 150mmf, C10 is not used.
Note 2. When C11 is 2300mmf, C12 is not used.
Note 3. When C16 is 1150mmf, C17 is not used.
Note 4. When C18 is 2300mmf, C19 is not used.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FAIRCHILD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K		80192					16RPM Adjustment
B	500K							33RPM Adjustment
R2A	500K		80192					78RPM Adjustment
B	500K							45RPM Adjustment
R3A	500Ω	1(WW)	CM20858	WN-501	A43-500	WPS500	R500L	Osc. Adjustment
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	FAIRCHILD PART No.	NOTES
R4	2.2meg 1%			
R5	2meg 1%			
R6	47K			
R7	3900Ω 1%			Note 1.
R8	100K			
R9	680Ω			Note 2.
R10	5600Ω			
R11	3300Ω 5%			
R12	1500Ω			
R13	220K			
R14	180K			
R15	1000Ω			
R16	100K	1		
R17	220K			
R18	180K			

ITEM No.	RATING OHMS	RATING WATT	FAIRCHILD PART No.	NOTES
R19	1000Ω			
R20	100K	1		
R21	2.2meg			
R22	10K 10%	10		
R23	2.2meg			
R24	100Ω			
R25	5600Ω			
R26	100Ω			
R27	5600Ω			
R28	100Ω			
R29	500Ω	10		
R30	18Ω	1		Note 3.
R31	27K			
R32	33K			

Note 1. Some versions may use 4700Ω 2% in this application.
Note 2. Not used in some versions.
Note 3. Some versions may use 15Ω 1W in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA FAIRCHILD PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	160V @ .165A Tap @ 117V @ 1.13A, 85V @ .3A, 6.3V @ .15A			B80190						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RESISTANCE PRI.	REPLACEMENT DATA FAIRCHILD PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	110Ω Tap @ 84Ω, 28Ω, 23Ω	D80187							

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA FAIRCHILD PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.165A		1009A	6RS250 3FS1①	208D M500①	①Silicon Type
M2	.165A		1009A	6RS250 3FS1①	208D M500①	
M3	.00085A		1159	CR-20	10	

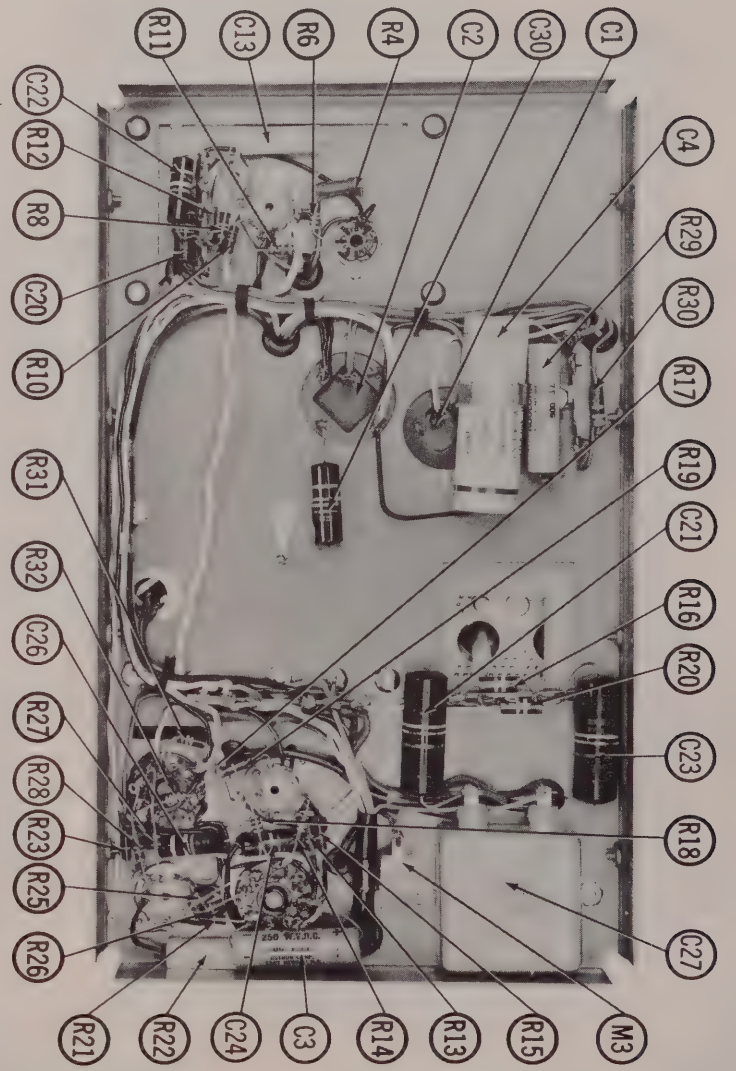
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA FAIRCHILD PART No. FUSE	FAIRCHILD PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M4	3AG	2A 250V			312002. (2A 250V)	342001	AGC2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	FAIRCHILD PART No.	NOTES
M5	Lamp		#47
M6	Lamp		120V. 3W
M7	Switch		Power Off-On, Toggle Type
M8	Switch		Speed Selector, Rotary Wafer Type
M9	Motor		Syncronous Drive

CHASSIS—BOTTOM VIEW



WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

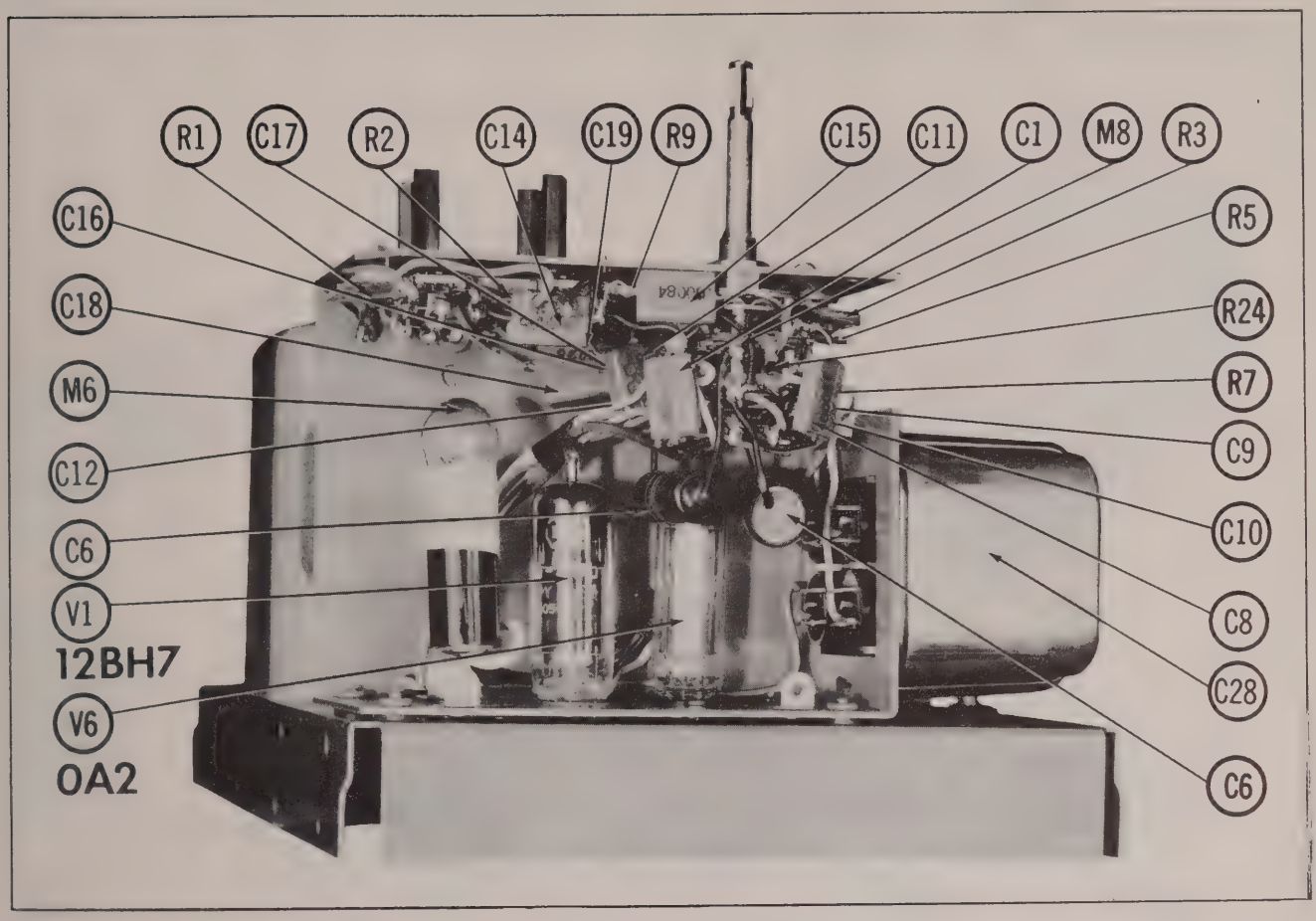


FIG. 4 CHASSIS SIDE VIEW

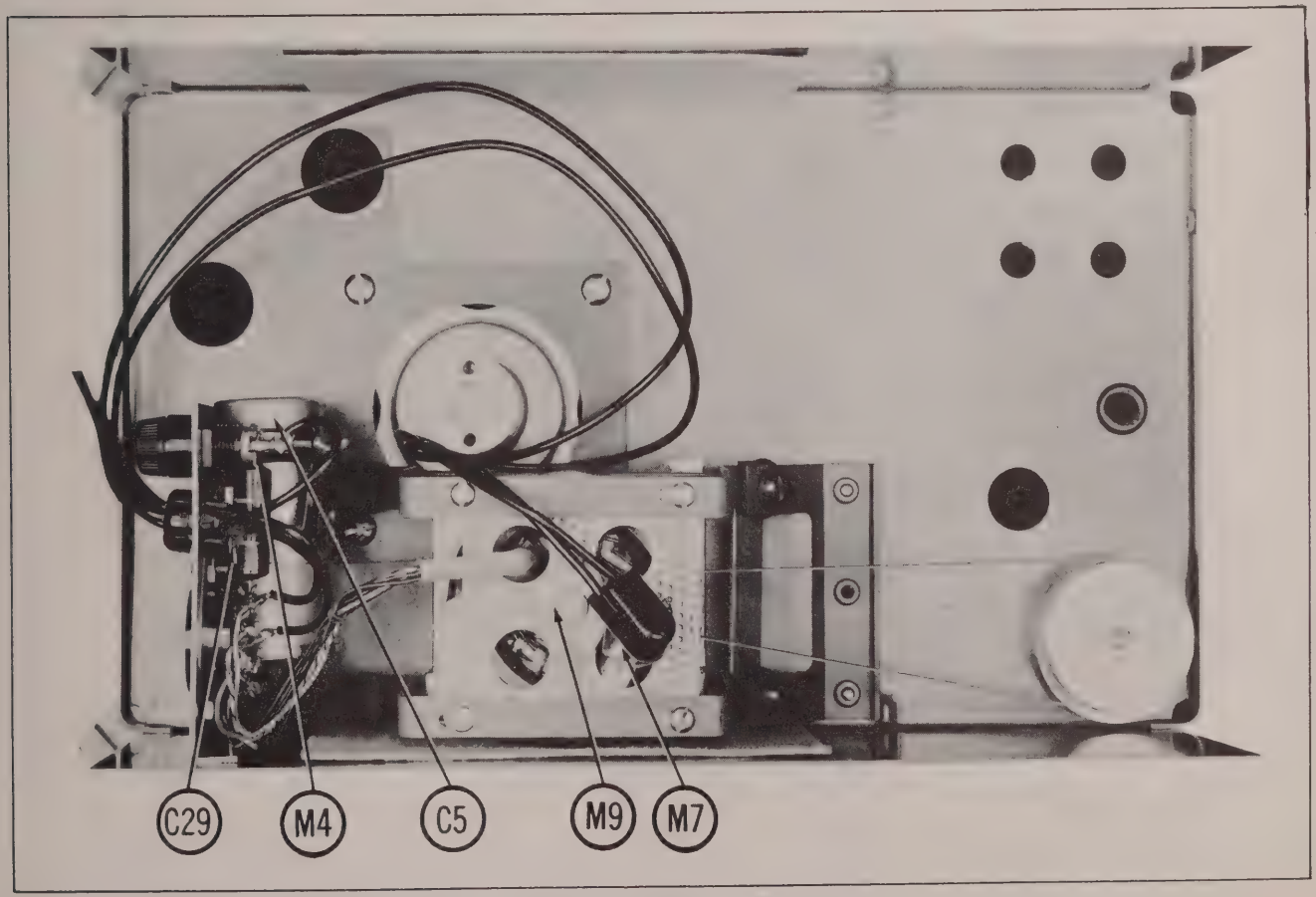
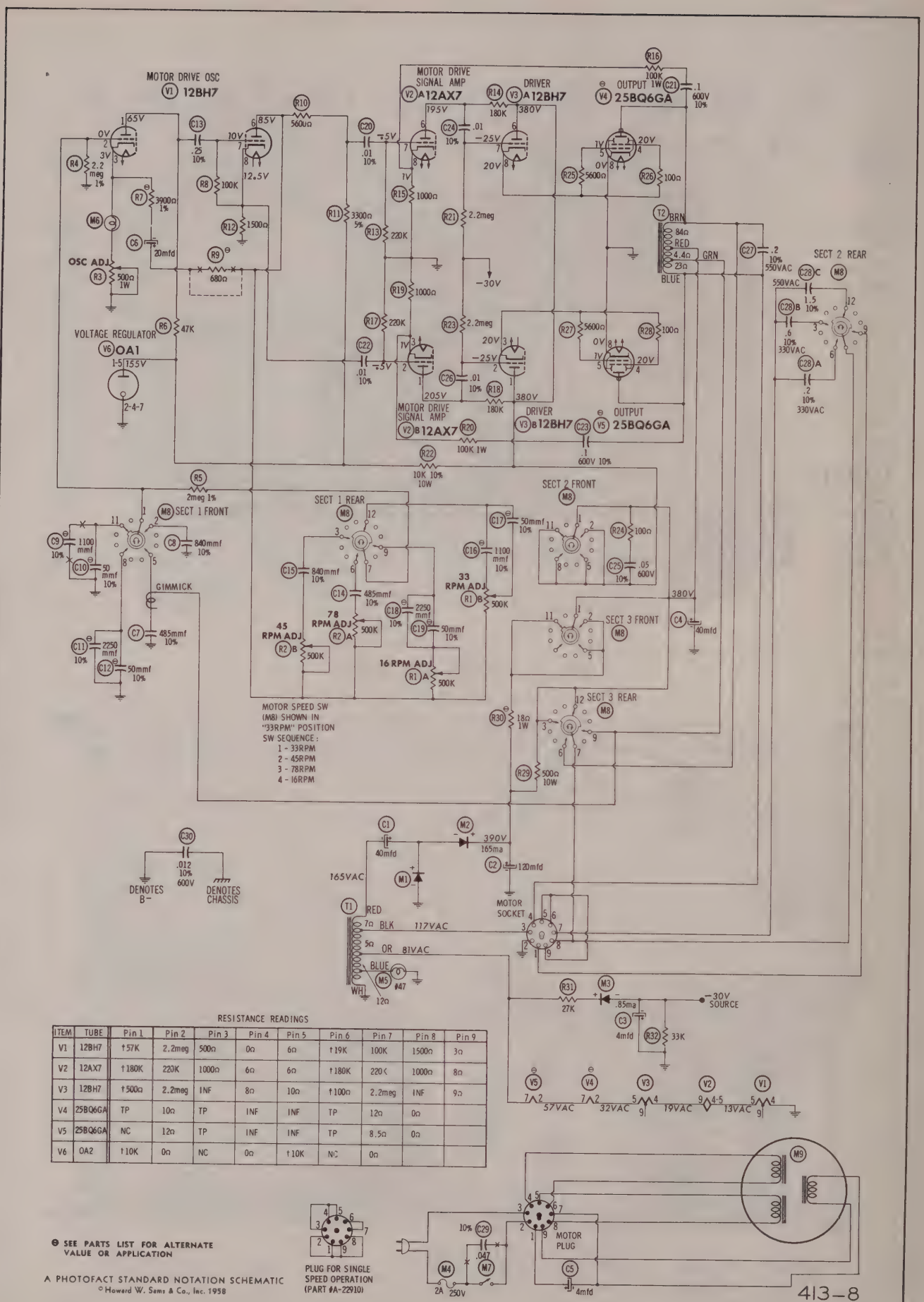


FIG. 5 BOTTOM VIEW OF BASEPLATE



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BH7	†57K	2.2meg	500Ω	0Ω	6Ω	†19K	100K	1500Ω	3Ω
V2	12AX7	†180K	220K	1000Ω	6Ω	6Ω	†180K	220K	1000Ω	8Ω
V3	12BH7	†500Ω	2.2meg	INF	8Ω	10Ω	†100Ω	2.2meg	INF	9Ω
V4	25BQ6GA	TP	10Ω	TP	INF	INF	TP	12Ω	0Ω	
V5	25BQ6GA	NC	12Ω	TP	INF	INF	TP	8.5Ω	0Ω	
V6	OA2	†10K	0Ω	NC	0Ω	†10K	NC	0Ω		

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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413-8

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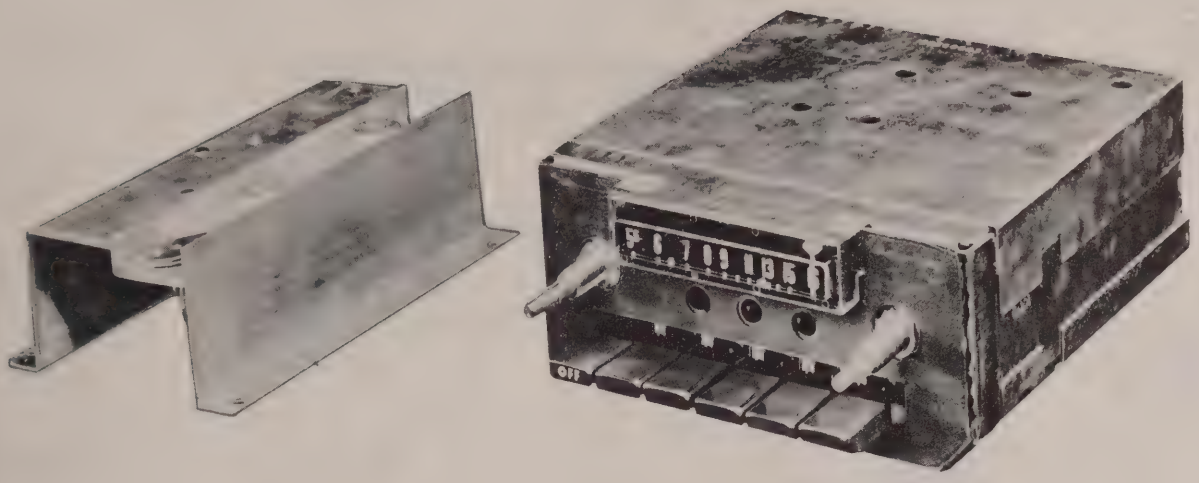
FORD MODEL 84MS (FEV-18805-F)

FORD MODEL 84MS (FEV-18805-F)



TRADE NAME	Ford Model 84MS (FEV-18805-F) For 1958 Ford Thunderbird Automobiles
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Custom Built AM Automobile Receiver with Transistorized Output
TUBES (Four)	Types 12AF6 RF Amplifier, 12AD6 Converter, 12BL6 IF Amplifier, 12DL8 Det.-AVC-AF Amp.
POWER SUPPLY	12 Volt Storage Battery — RATING 1.8 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	535KC to 1610KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Top and bottom covers should be in place.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to antenna receptacle. Low side to chassis.	262.5KC (400~ Mod)	High Freq. End Stop	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to antenna receptacle.	1610KC	"	"	A5, A6, A7	"
	Steps 3 and 4 are not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, back tuning cores (A8, A9, A10) 1/4" out of coils. (Alignment tool Motorola #66A76278 may be used). Repeat step 2.						
3.	Fig. 1	Thru dummy to antenna receptacle.	1180KC	1 9/64" from High Freq. End Stop	Across Voice Coil	A8, A9, A10	Adjust for maximum output.
4.	"	"	1610KC	High Freq. End Stop	"	A5, A6, A7	Adjust for maximum output. Repeat steps 3 and 4. Cement cores.
5.	"	"	600KC @ 5 microvolts	Tune for 600KC signal	"	R3	Adjust for 1.79 volts output.
6.	With radio installed in car and antenna fully extended, tune in a weak station near 1200KC and adjust A7 for maximum output.						

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton out.
2. Tune manually to desired station.
3. Press pushbutton in firmly.
4. Repeat for remaining buttons.

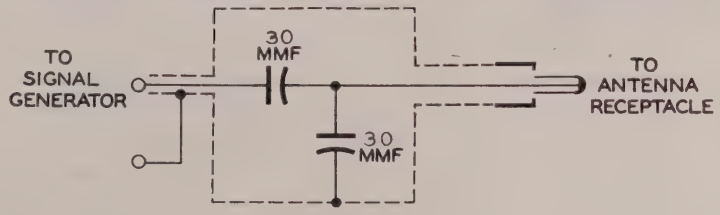


FIG. 1

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H592

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SET 413 FOLDER 9

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	12AF6	
V2	Converter	12AD6	
V3	IF Amplifier	12BL6	
V4	Det.-AVC-AF Amp.	12DL8	

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N176	Output	CBS-2N155	2N176		2N176	
X2	2N176	Output	CBS-2N155	2N176		2N176	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	100	16	23B560487 ①	AFH3-00-90		WP300.51			R2664 *
B	■500	16							
C	▲100	16							

① In some versions C1B is 400mfd (C1 Part #23B542329).
* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

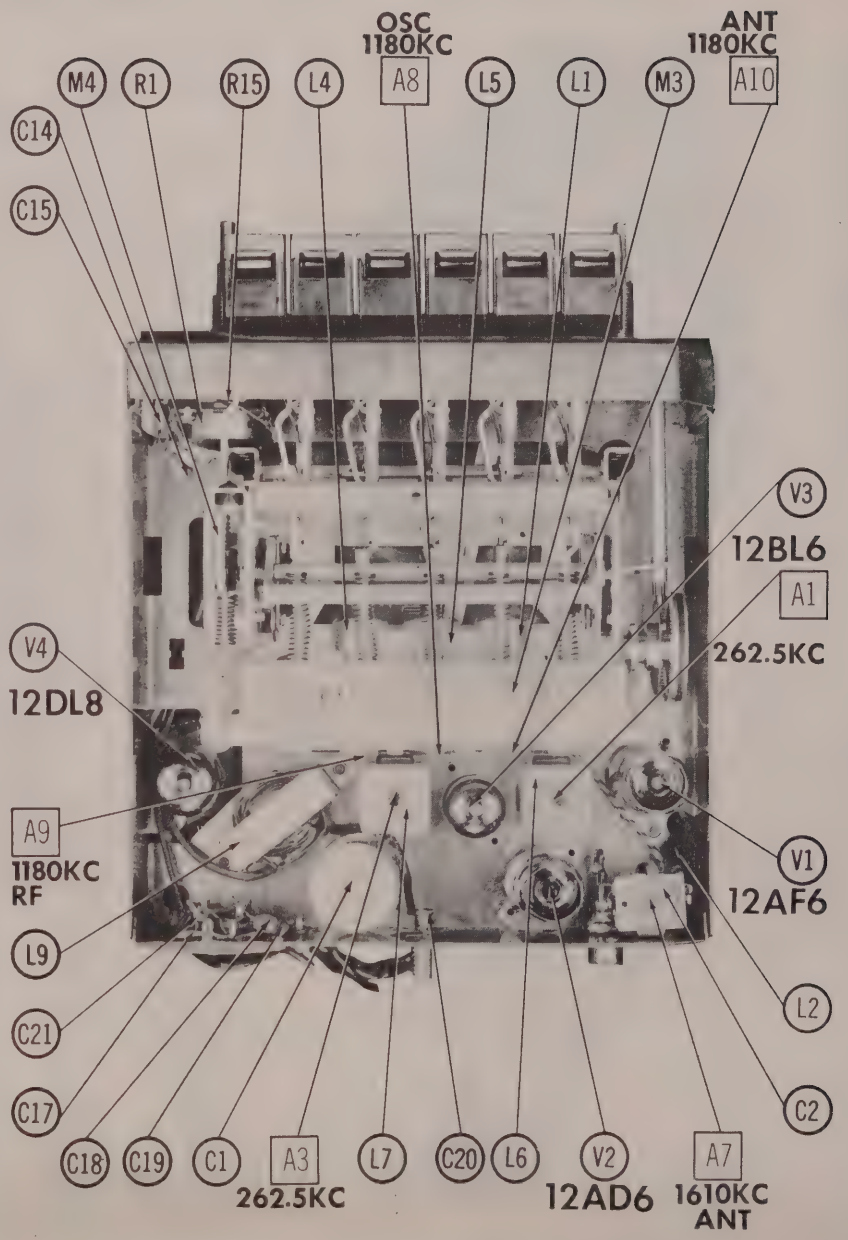
ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	20-180		20B560719						
C3	150		21R121228	N750-DI 150	DTN-150	C10T15U		5TCU-T15	N750 10%
C4	22		21R120539	N750-DI 22	DTN-22	C10Q22U		5TCU-Q22	N750 10%
C5	.1	200	8R121573	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C6	75-380		20K511136						
C7	47		21R114207	N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750 10%
C8	47		21R114207	N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750 10%
C9	47		21R125783						N750 5%
C10	400-520		20K560628						
C11	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C12	100		21R410036	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750 10%
C13	100		21R410036	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750 10%
C14	1000		21R410127	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C15	1000		21R410127	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C16	5000		21R115312	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C17	220		21R410115	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C18	220		21R410115	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C19	220		21R410115	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C20			21A560232						
C21			21A560232						

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	4meg	½	18B560007				■ UE3813	Tone
B	1meg	½						Volume, Tap ③ 500K
R2	400Ω	1(WW)	18B541877					Balance
R3	1000Ω	1(WW)	18K732740					Sensitivity

■ "STA-LOC" Equivalent: FF46L, CS1187, RU16T55, IS1687.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less. unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	NOTES
R4	3.3meg		6K119407	
R5	1.5meg		6R6460	
R6	8.2meg		6R5585	
R7	1500Ω		6R6038	
R8	4700Ω		6K121847	
R9	1meg		6K124494	
R10	3.3meg		6K121278	
R11	4.7meg		6K121277	
R12	33K		6K121704	
R13	47K		6K121687	

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	NOTES
R14	15meg		6R476065	
R15	56K		6K127541	
R16	10meg		6K119408	
R17	10Ω		6R118245	
R18	.33Ω		17K542316	
R19	7.5ΩCold		6K542314	
R20	.33Ω		17K542316	
R21	7.5ΩCold		6K542314	
R22	10Ω		6R118245	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA MOTOROLA PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Coil	24C535458					Note 1
L2	RF Choke	24A538910					Includes 15mmf Cap.
L3	IF Trap Coil	24K560753		TV-193	6110		63 Microhenries
L4	RF Coil	24C535459					Note 1
L5	Osc. Coil	24C535456					Note 1
L6	Input IF	24K560419	16-6752	BC-350	12-H1	RF-3	
L7	Output IF	24B542371					
L8	RF Choke	24C539614	19-3180	TV-184	6180	VP-5	180 Microhenries

Note 1. Part of M3.

FILTER CHOKE

ITEM No.	RATINGS CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stanco PART No.	Thordarson PART No.	Triad PART No.
L9	1.8A	.3Ω	004 Hy.	25K560710						

TRANSFORMER (INTERSTAGE)

ITEM No.	Turns Ratio PRI.	Turns Ratio SEC. 1	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	5.5 :	1	25K542303							
		SEC. 2								
	5.5 :	1								

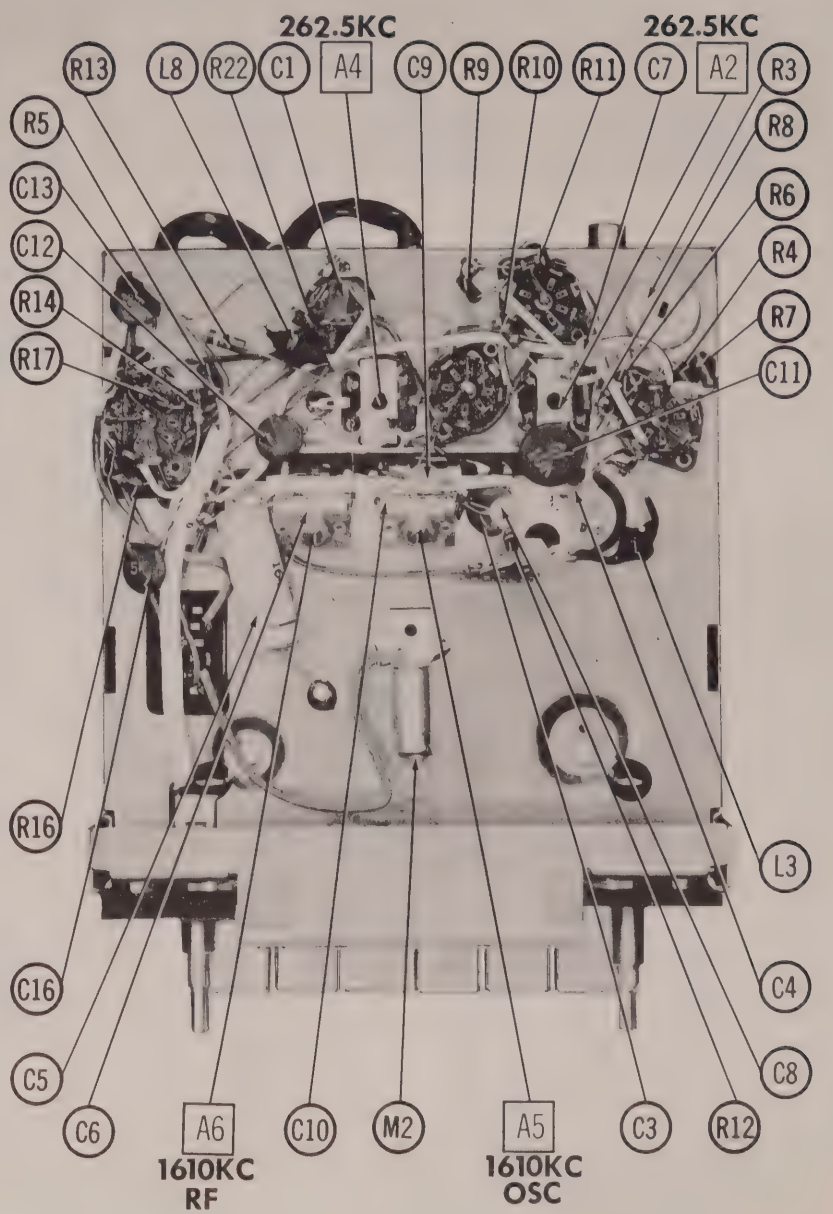
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	47Ω CT	3-4Ω	25K542313							

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA MOTOROLA PART No.	QUAM PART No.	NOTES
SP1	6"x 9"	PM	3-4Ω	50D542405		

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1		7½A 32V	65R122346	9K561110				

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Lamp	65R535060	#57
M3	Tuner	77D560626	(AT-229) Complete, Less Manual Tuning Shaft
M4	Switch	40A560051	On-Off, Slide Type

CABINETS & CABINET PARTS

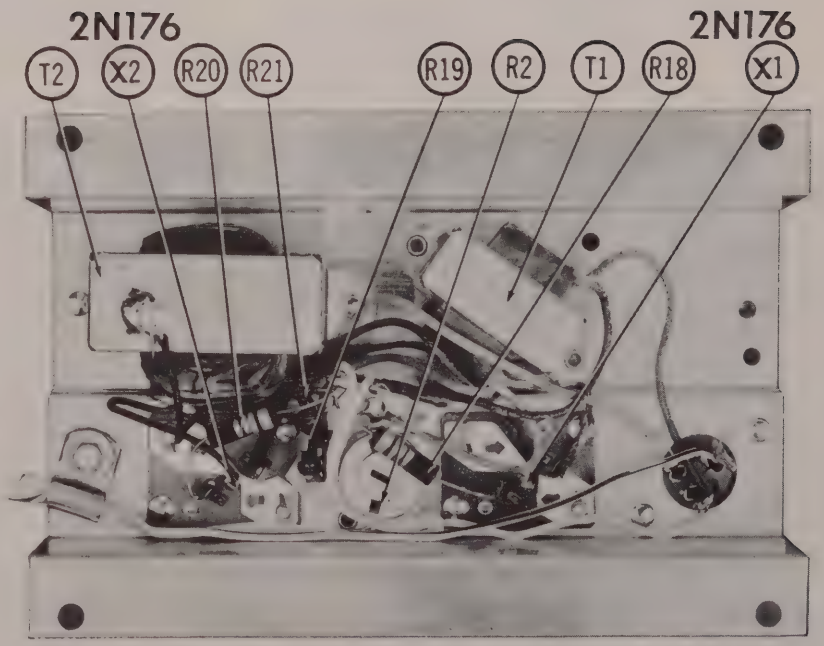
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

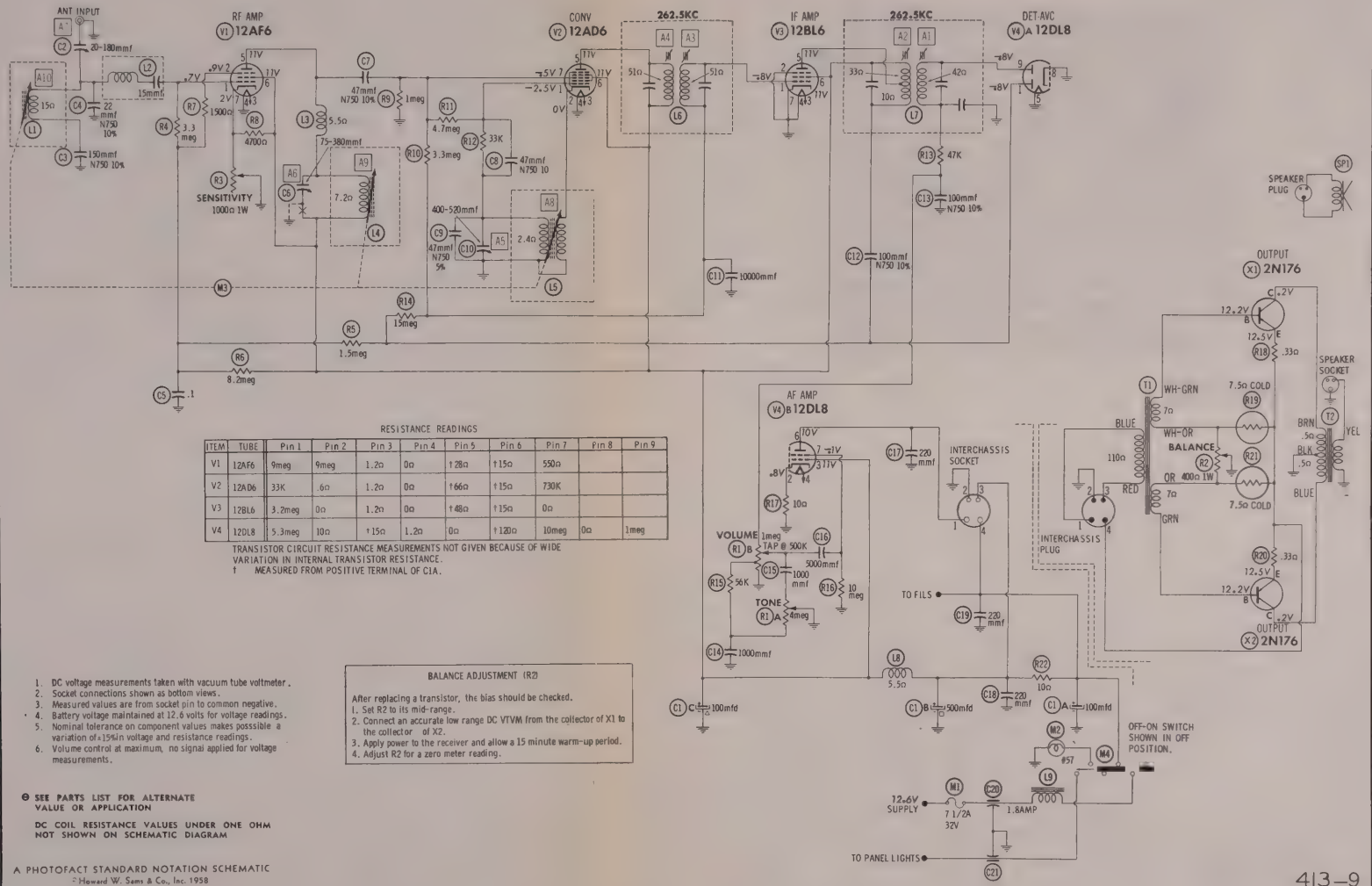
NAME	PART NO.	DESCRIPTION
Knob	36B539472	Volume & Tuning
Knob	36B560029	Disc, Tone & Dummy
Pushbutton	38B560075	Station Selector (5 used)
Pushbutton	38K560076	Off
Dial Scale	34B560031	

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire	Use BELDEN No. 8885
Bonding Strap	Use BELDEN No. 8661

POWER CHASSIS





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AF6	9meg	9meg	1.2Ω	0Ω	†28Ω	†15Ω	550Ω		
V2	12AD6	33K	.6Ω	1.2Ω	0Ω	†66Ω	†15Ω	730K		
V3	12BL6	3.2meg	0Ω	1.2Ω	0Ω	†48Ω	†15Ω	0Ω		
V4	12DL8	5.3meg	10Ω	†15Ω	1.2Ω	0Ω	†120Ω	10meg	0Ω	1meg

TRANSISTOR CIRCUIT RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.
† MEASURED FROM POSITIVE TERMINAL OF C1A.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

BALANCE ADJUSTMENT (R2)

After replacing a transistor, the bias should be checked.
1. Set R2 to its mid-range.
2. Connect an accurate low range DC VTVM from the collector of X1 to the collector of X2.
3. Apply power to the receiver and allow a 15 minute warm-up period.
4. Adjust R2 for a zero meter reading.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

MAGNAVOX
CHASSIS CR-744AA

MAGNAVOX
CHASSIS CR-744AA

MAGNAVOX
CHASSIS CR-744AA

TRADE NAME	Magnavox Chassis CR-744AA
MANUFACTURER	Magnavox Co., 2131 Bueter Road, Fort Wayne 4, Indiana
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	4 Volts DC
TUNING RANGE—BROADCAST	535-1620KC
RATING	5.2MA @ 4 Volts DC (No Signal, MIN. Volume) 22MA @ 4 Volts DC (Signal, Max. Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.5mfd	High side to Base of X1. Low side to chassis.	455KC (400~ Mod)	Tuning, Gang fully open.	Across Voice Coil	A1, A2, A3	Adjust for maximum output.
2.		Loop	1620KC	1620KC	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	535KC	535KC	"	A5	"
4.		"	1400KC	1400KC	"	A6	"

DISASSEMBLY

1. Unscrew tuning dial brass button. Remove dial.
2. Remove 2 screws under dial.
3. Apply pressure at slot in cabinet top and seperate cabinet back from front.
4. Remove battery. Remove screw from center of battery compartment.
5. Remove chassis.

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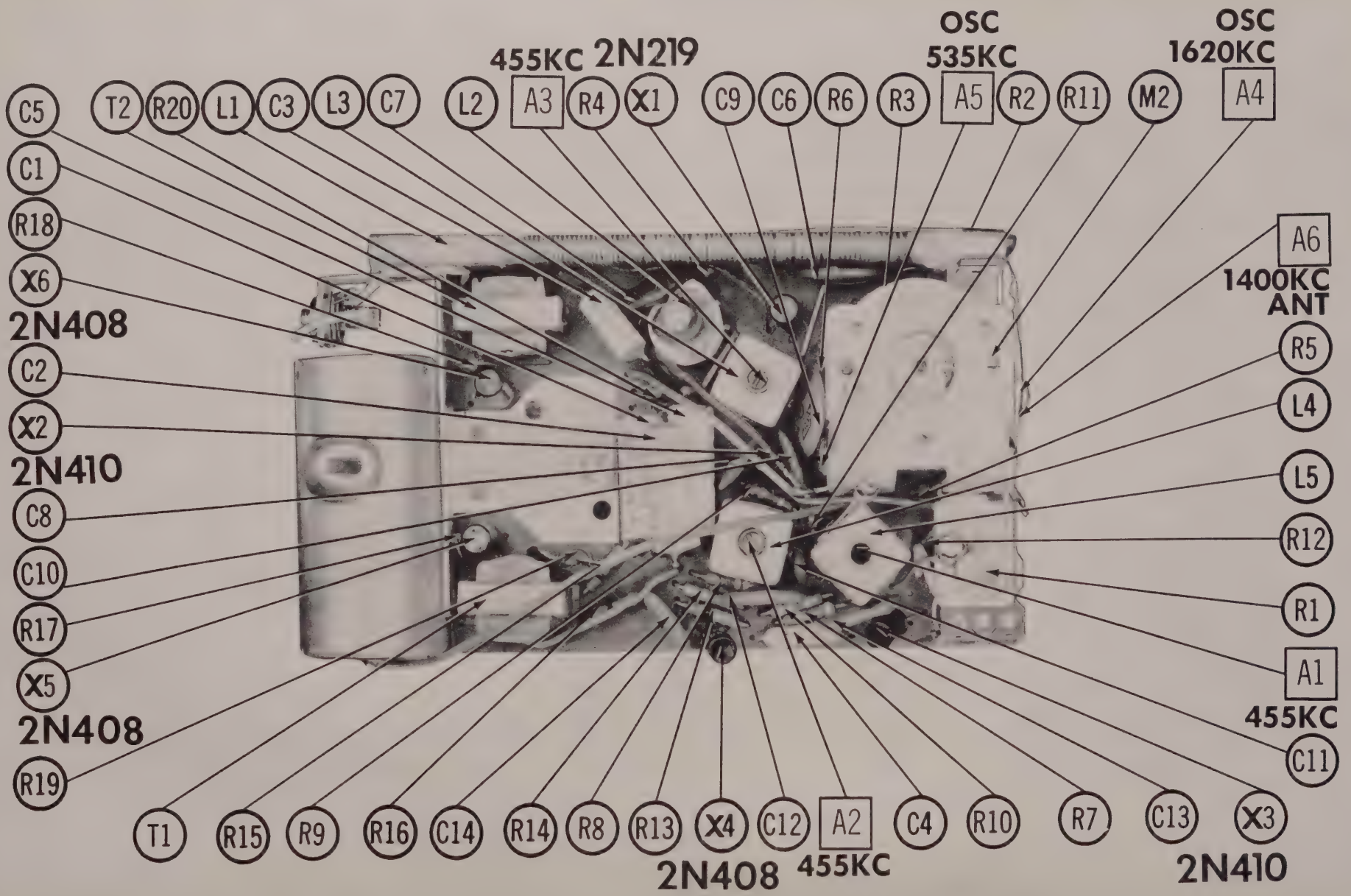
H483

SET 413 FOLDER 10



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N219	Converter		2N219	2N486		
X2	2N410	1st IF Amplifier		2N218	2N483		Alternate 2N218
X3	2N410	2nd IF Amplifier		2N218	2N483		Alternate 2N218
X4	2N408	AF Amplifier		2N217	CK872/ 2N362	2N34	Alternate 2N217
X5	2N408	Output		2N217	CK878/ 2N359	2N34	Alternate 2N217
X6	2N408	Output		2N217	CK878/ 2N359	2N34	Alternate 2N217

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Magnavox PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	50	10	270559-5	PWE10050	NL50-10	TT10X50	ML50-15		TE-1160
C2	50	10	270559-5	PWE10050	NL50-10	TT10X50	ML50-15		TE-1160
C3	10	10	270559-6	XPP-10010	NL10-10	TT12X10	ML10-15		TE-1114
C4	4	6	270559-7	XPP-6004	NL4-6	TT6X5	ML4-6		TE-1083
C5	50	10	270559-5	PWE10050	NL50-10	TT10X50	ML50-15		TE-1160

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Magnavox PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	100000				DA-104				①
C7	10000		250175-6	BPD-01	DM-103	BYA10S1	DC511	5HK-S1	①
C8	110		250175-56		TCN-110	C10T11U			N750 10%
C9	50000		250758-3	BPD-05	DA-503			5HK-S5	
C10	50000		250758-3	BPD-05	DA-503			5HK-S5	
C11	39		250175-20		TCN-39	C10Q39U			N750
C12	50000		250758-3	BPD-05	DA-503			5HK-S5	
C13	100000				DA-104				①
C14	20000		250758-4	BPD-02	DD-203	BYB6S2		5HK-S2	②

①Some versions may use 50000mmf in this application (Part #250758-3)
②Some versions may use 10000mmf in this application (Part #250175-6)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Magnavox PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	5000Ω	½	220662-1					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Magnavox PART No.	NOTES
	OHMS	WATT		
R2	10K		230702-132	
R3	47K		230702-139	
R4	820Ω		230702-121	
R5	27K		230702-136	
R6	330Ω		230702-116	
R7	4700Ω		230702-128	
R8	22K		230702-135	
R9	330Ω		230702-116	
R10	330Ω		230702-116	
R11	1200Ω 5%		230702-152	

ITEM No.	RATING		Magnavox PART No.	NOTES
	OHMS	WATT		
R12	1500Ω		230702-123	
R13	10K		230702-132	
R14	27K		230702-136	
R15	1000Ω		230702-122	
R16	100Ω		230702-110	
R17	15K		230702-133	
R18	15K		230702-133	
R19	4.7Ω	1	230109-3	
R20	100Ω		230702-110	

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Magnavox PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1.5	:1CT	320817-1					TR3		

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Magnavox PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	117Ω CT	13Ω	320818-1							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Magnavox PART No.	QUAM PART No.	
SP1	2 3/4"	PM	13Ω	580352-1		

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		Magnavox PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Stick	461512-2					
L2	Osc. Coil	361229-1					
L3	1st IF	360710-1					
L4	2nd IF	360711-1					
L5	3rd IF	360712-1					Includes Resistor, Crystal and 2 Caps.

BATTERIES

ITEM No.	VOLTAGE	Magnavox PART No.	REPLACEMENT DATA								NOTES
			BURGESS		EVEREADY		MALLORY		RAY-O-VAC		
			"A"	"B"	"A"	"B"	"A"	"B"	"A"	"B"	
M1	4	530043-1				E233		TR-233R			

MISCELLANEOUS

ITEM No.	PART NAME	Magnavox PART No.	NOTES
M2	Tuning Cap.	260606-2	2 Gang, (Ant. 23-218mmf, Osc. 21-120mmf)
	Printed Board	T-210552-4A	
	Earphone	580043-1	

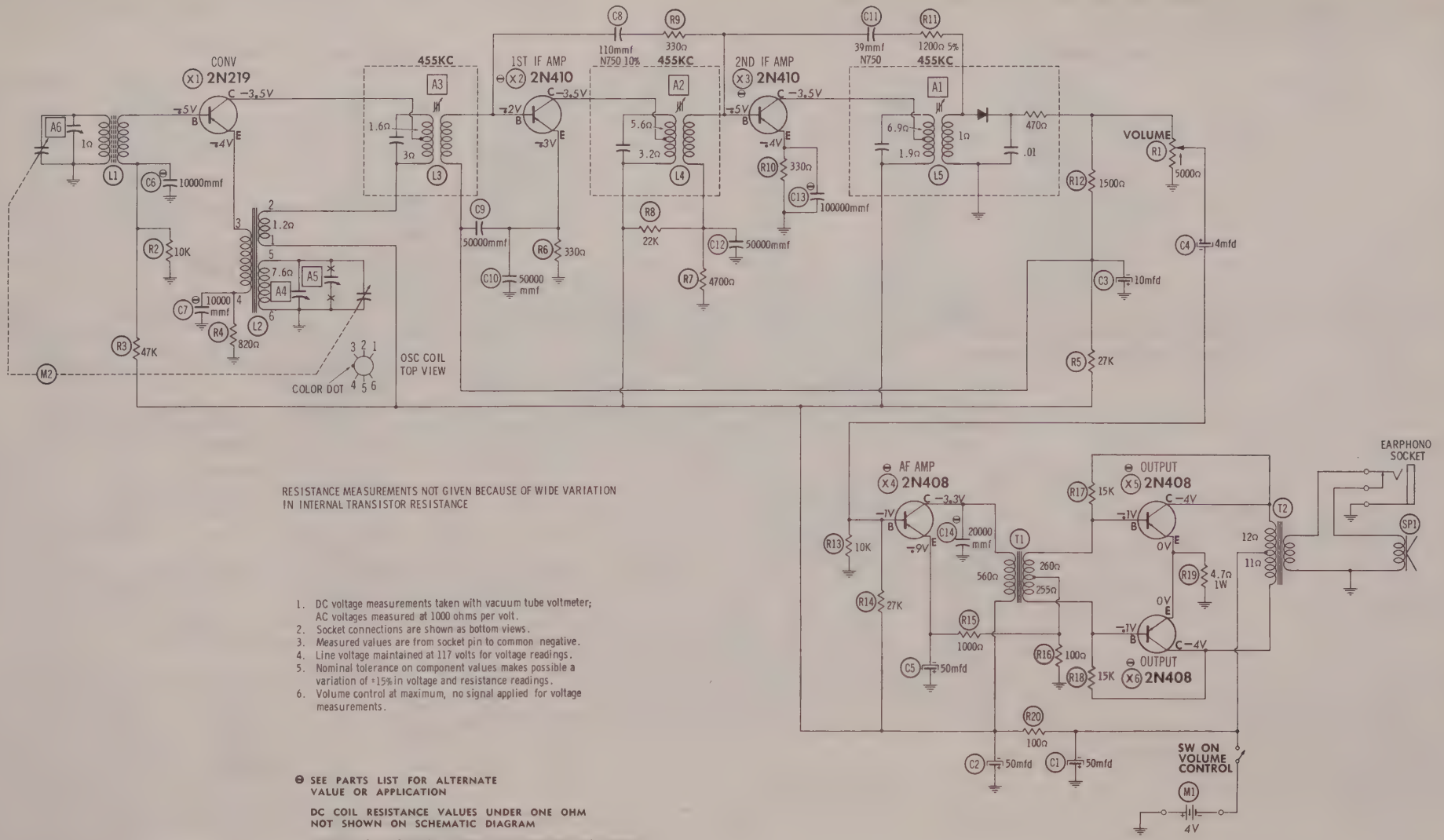
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	140773-2	Volume
Knob	140772-2	Tuning
Button	106268-2	Brass, Tuning Knob
Cabinet	884270-22	Front Ass'y, Black
Cabinet	884270-23	Front Ass'y, Ivory
Cabinet	884270-24	Front Ass'y, Forrest Green
Cabinet	884270-25	Front Ass'y, Spring Green
Cabinet	884270-26	Front Ass'y, Turquoise
Cabinet	884270-27	Front Ass'y, Coral
Cabinet	884270-28	Front Ass'y, Red
Cabinet	441573-3	Back, Black
Cabinet	441573-2	Back, Ivory
Cabinet	441573-4	Back, Forrest Green
Cabinet	441573-5	Back, Spring Green
Cabinet	441573-6	Back, Turquoise
Cabinet	441573-7	Back, Coral

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors



RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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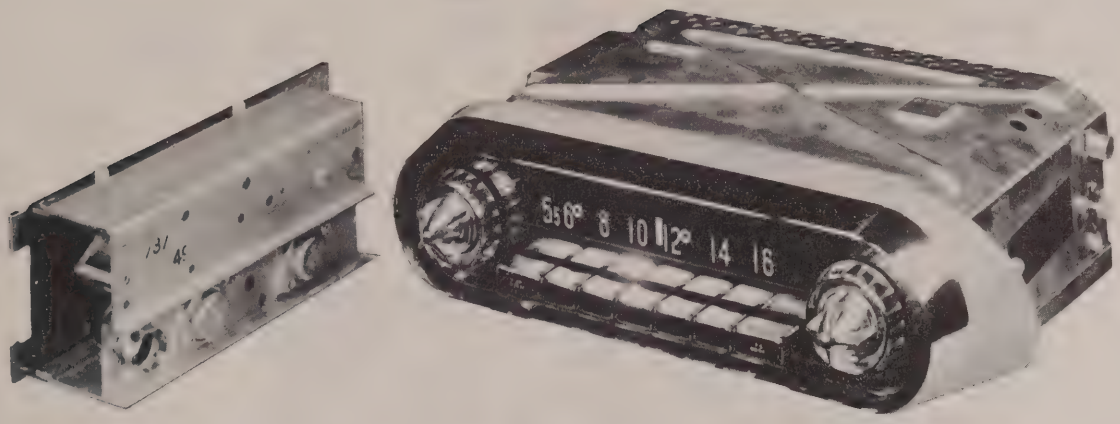
PHOTOFACT* Folder

EIA

MOPAR
MODEL 923



TRADE NAME	Mopar Model 923 (For 1958 L51, L52, L53 DeSoto Automobiles)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Custom Built AM Automobile Receiver With Transistorized Output
TUBES (Six)	Types 12EG6 RF Amplifier, 12AD6 Converter, 12BL6 1st. IF Amplifier, 12BL6 2nd. IF Amplifier, 12DL8 Det.-AVC-AF Amp., 12AL8 Trigger
POWER SUPPLY	12 Volt Storage Battery — RATING 2 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	535-1605KC

ALIGNMENT INSTRUCTIONS

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of 12AD6 (V2). Low side to chassis.	262.5KC (400∿ Mod)	High Freq. End Stop	Use VTVM. DC probe to point (A). Common to chassis.	A1, A2, A3	Adjust for maximum deflection.
2.	"	"	"	"	"	A4	Adjust for zero deflection.
3.	Fig. 1	Thru dummy to ant. receptacle.	1610KC	"	OUTPUT METER Across voice coil.	A5, A6, A7	Adjust for maximum output.
	Steps 4, 5 and 6 are not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, remove escutcheon to expose tuning cores. Back cores (A8, A9, A10) out of coil forms. Repeat step 3.						
4.	Fig. 1	Thru dummy to ant. receptacle.	1020KC	Tuning carriage 4 9/64" from high frequency end stop.	OUTPUT METER Across voice coil.	A8, A9, A10	Adjust for maximum output.
5.	"	"	1610KC	High Freq. End Stop.	"	A5, A6, A7	Adjust for maximum output. Repeat steps 4 and 5.
6.	"	"	1925KC	1400KC	"	A11	Adjust for MINIMUM output.
7.	"	"	1000KC (@ 5 microvolts)	Tune to 1000KC signal	"	R4	Adjust for 1.79V meter reading.
8.	"	"	1000KC (@250 microvolts)	"	"	R3	Turn off radio. Press local button, release. Short "B" of M8 relay to chassis. Turn on radio. Adjust R3 for 1.75V meter reading.
9.	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output.						

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton out.
2. Tune manually to desired station.
3. Press button in firmly.
4. Repeat for remaining buttons.

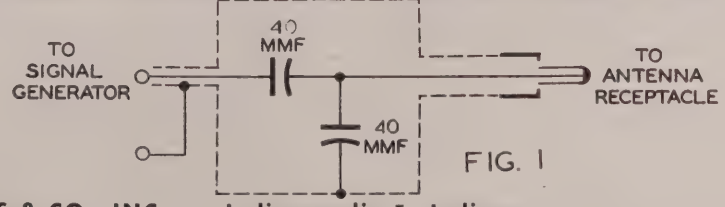


FIG. 1

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H492

MOPAR MODEL 923
MOPAR MODEL 923
SET 413 FOLDER 11

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	12EG6	
V2	Converter	12AD6	
V3	1st. IF Amp.	12BL6	

ITEM No.	USE	TYPE	NOTES
V4	2nd. IF Amp.	12BL6	
V5	Det.-AVC-AF Amp.	12DL8	
V6	Trigger	12AL8	

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N176	Output	CBS-2N155	2N176		2N176	
X2	2N176	Output	CBS-2N155	2N176		2N176	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	100	16	23B542329	AFH3-00-90		WP300.5			R2634 *
B	■400	16							
C	▲100	16							

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

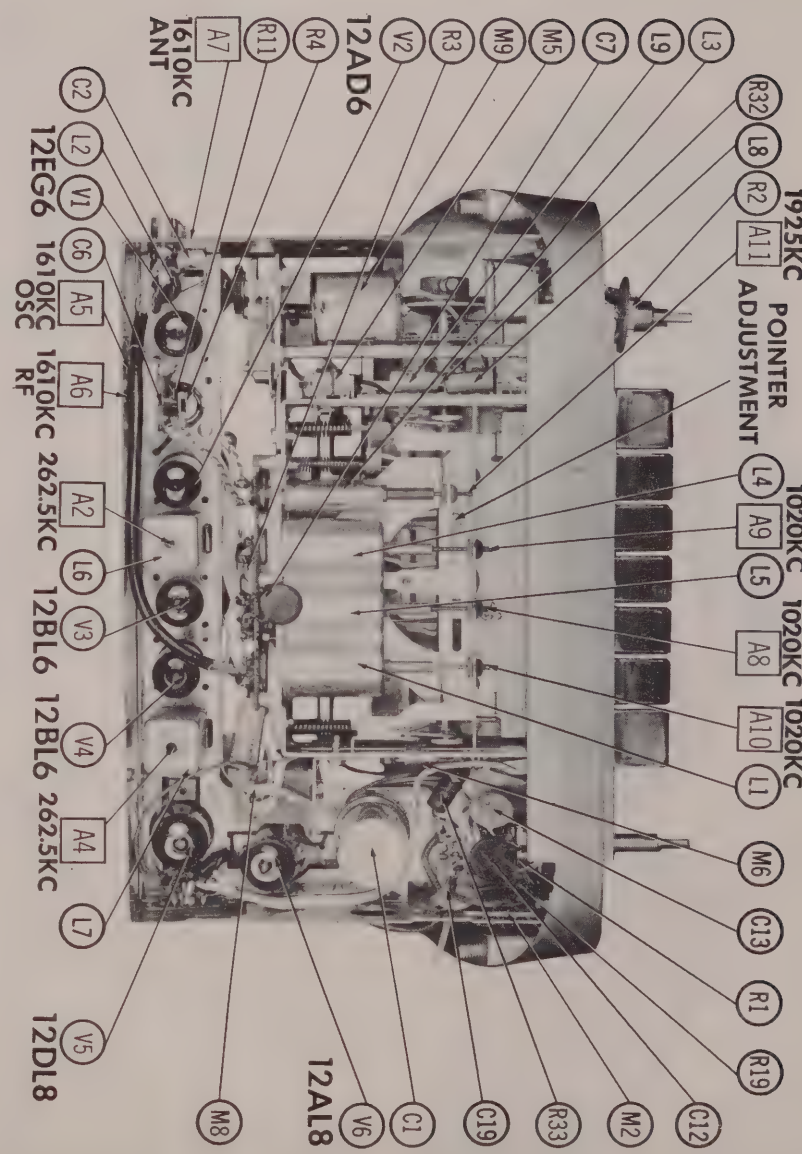
ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	18-115		20K542026						
C3	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C4	.05	200	8R121005	P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C5	3.9		21R115953						10%
C6A	50-260		20B539612						
B	47								
C	120-210								
C7	100		21R124032						N220 5%
C8	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C9	220		21K121698		MD-221	L10T22		5TCC-T22	10%
C10	2.7		21R115950						10%
C11	100		21R410036	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750 10%
C12	3300		21R120422	BPD-0033	DD-332	BYA10D33	UC-5233	5HK-D33	
C13	2000		21R121106	BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C14	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C15	100		21R410036	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750 10%
C16	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C17	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C18	10000		21R482726	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C19	50000		21K542384	BPD-05	DF-503			5HK-S5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	4meg	½	18B539819	F1-83	RTV-616C		■ UE3746	Tone
B	1.5meg	½		R2-59				Volume, Tap ⓐ 330K
C	Switch			KB-7 or KB-7*				
R2	15Ω	1(WW)	18K540132					Speaker Fader
R3	1000Ω	1(WW)	18K538798					Sensitivity, Town
R4	2000Ω	1(WW)	18K520298		39-2000			Sensitivity, Normal
R5	400Ω	1(WW)	18B541877					Balance

■ "STA-LOC" Equivalent: FB46L, OS1625, RU16T334, IS2062, US-42.
* Use KR with CRL "red label" controls and KB with "blue label" controls.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	NOTES
R6	6.8meg		6K122321	
R7	1.5meg		6R3966	
R8	6.8meg		6K122321	
R9	12K		6K119933	
R10	5.6meg		6R3988	
R11	33K		6K121704	
R12	22K		6K119405	
R13	4700Ω		6R6039	
R14	6.8meg		6K122321	
R15	4.7meg		6K122326	
R16	120Ω		6R5551	
R17	2.2meg		6R3927	
R18	47K		6K121687	
R19	33K		6R6410	
R20	10meg		6K119408	
R21	10Ω		6R118245	
R22	8.2meg		6R5585	
R23	680K		6R6475	
R24	1.5meg		6R3966	
R25	4.7meg		6K122326	
R26	3300Ω		6R6036	
R27	.33Ω		17K542316	
R28	7.5Ω		6K542314	Note 1
R29	.33Ω		17K542316	
R30	7.5Ω		6K542314	Note 1
R31	27Ω		6B119401	
R32	47Ω	2	6K488035	
R33	22Ω	2	6R2009	

Note 1. Temperature compensating unit, 7.5Ω @ 25°C.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA MOTOROLA PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Coil	24C536308					
L2	RF Choke	24A532148	19-6033				31 Microhenries
L3	IF Trap	24K542330					
L4	RF Coil	24C536308					
L5	Osc. Coil	24B536300					
L6	Input IF	24K542374	16-6752	BC-350	12-H1	RF-3	
L7	Output IF	24B533073	16-6754	BC-354	12-H6		
L8	Search Motor Choke	24A542379					3.2 Microhenries
L9	Search Motor Choke	24A542379					3.2 Microhenries

FILTER CHOKE

ITEM No.	RATINGS CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L10	2A	.3Ω	.0045 Hy.	25C542312						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO PRI.	TURNS RATIO SEC.	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	5.5 :	1 SEC. 2	25K542303						
	5.5 :	1							

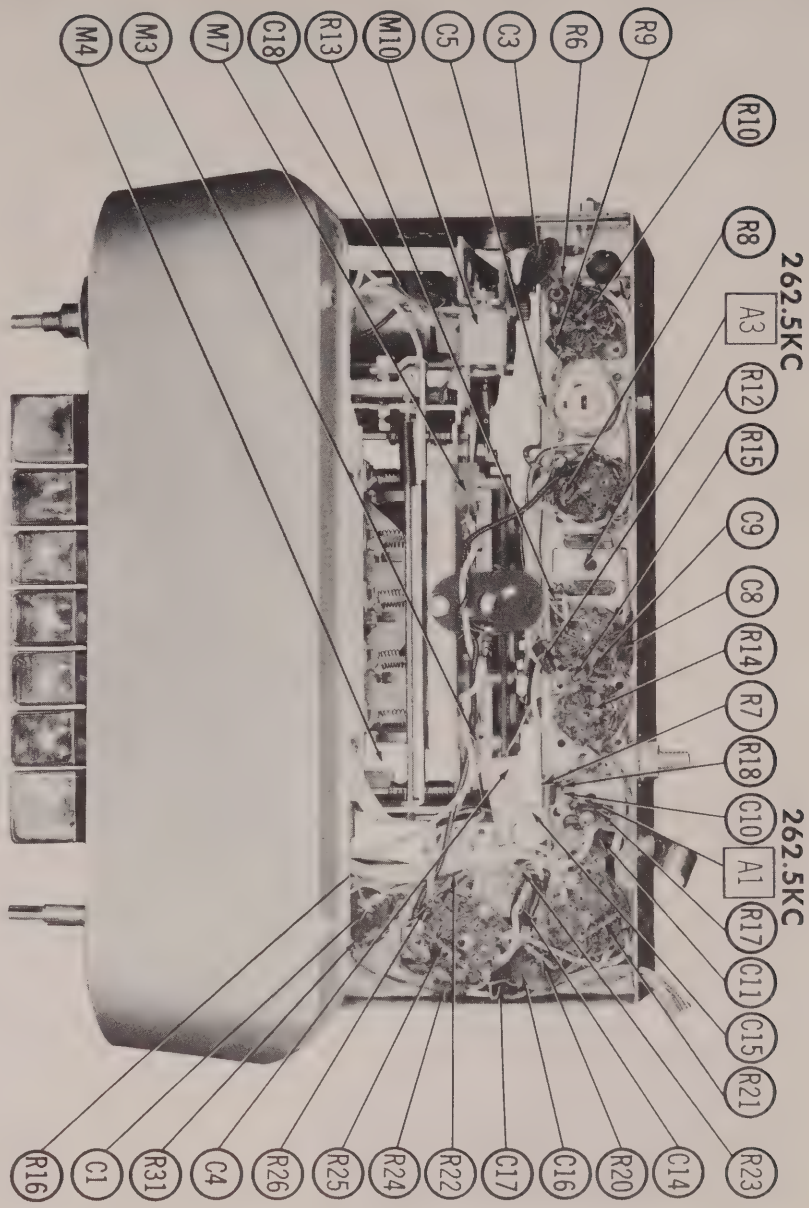
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	47Ω CT	4-6Ω	25K542313					TR-60		

SPEAKER

ITEM No.	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA MOTOROLA PART No.	QUAM PART No.	NOTES
SP1	5" x 7"	PM	4-6Ω	50K560421	57A15	

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	7AG	7½A 32V	65R122346	9K540495	30707.5 (7AG-7½A-32V)	155009	SFE 7½	HDH

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Spark Plate	48K539953	Selenium Type (Use #43A539954 Bushing, #5K124848 Eyelet, #4A542137 Cupwasher)
M3	Lamp	65R10867	#44
M4	Tuner	77E560264	(ST-228) Complete
M5	Switch	40B535396	Reversing
M6	Switch	40A535418	Sensitivity
M7	Switch	40A539926	Search, Distant, Local
M8	Relay	80K541296	
M9	Motor	59C542120	
M10	Solenoid	59A537563	

CABINETS & CABINET PARTS

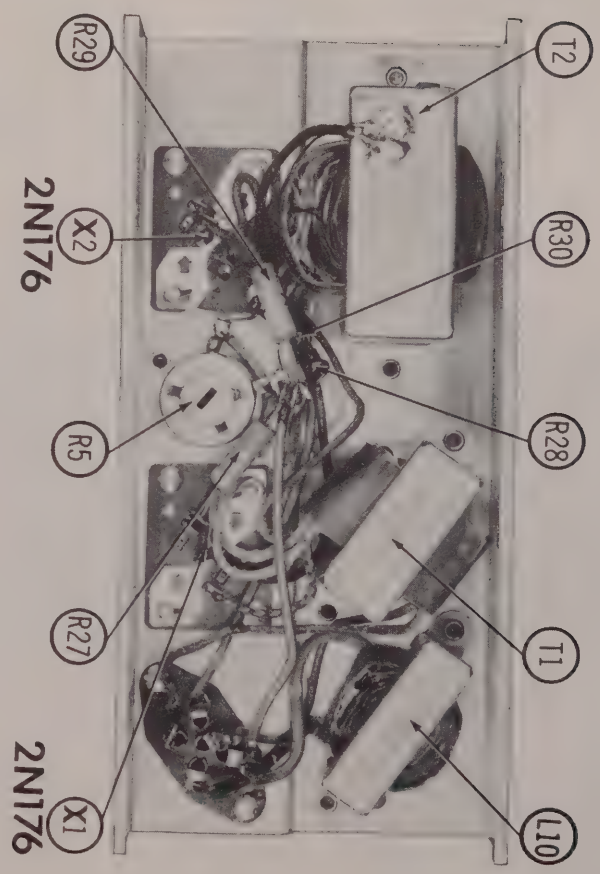
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

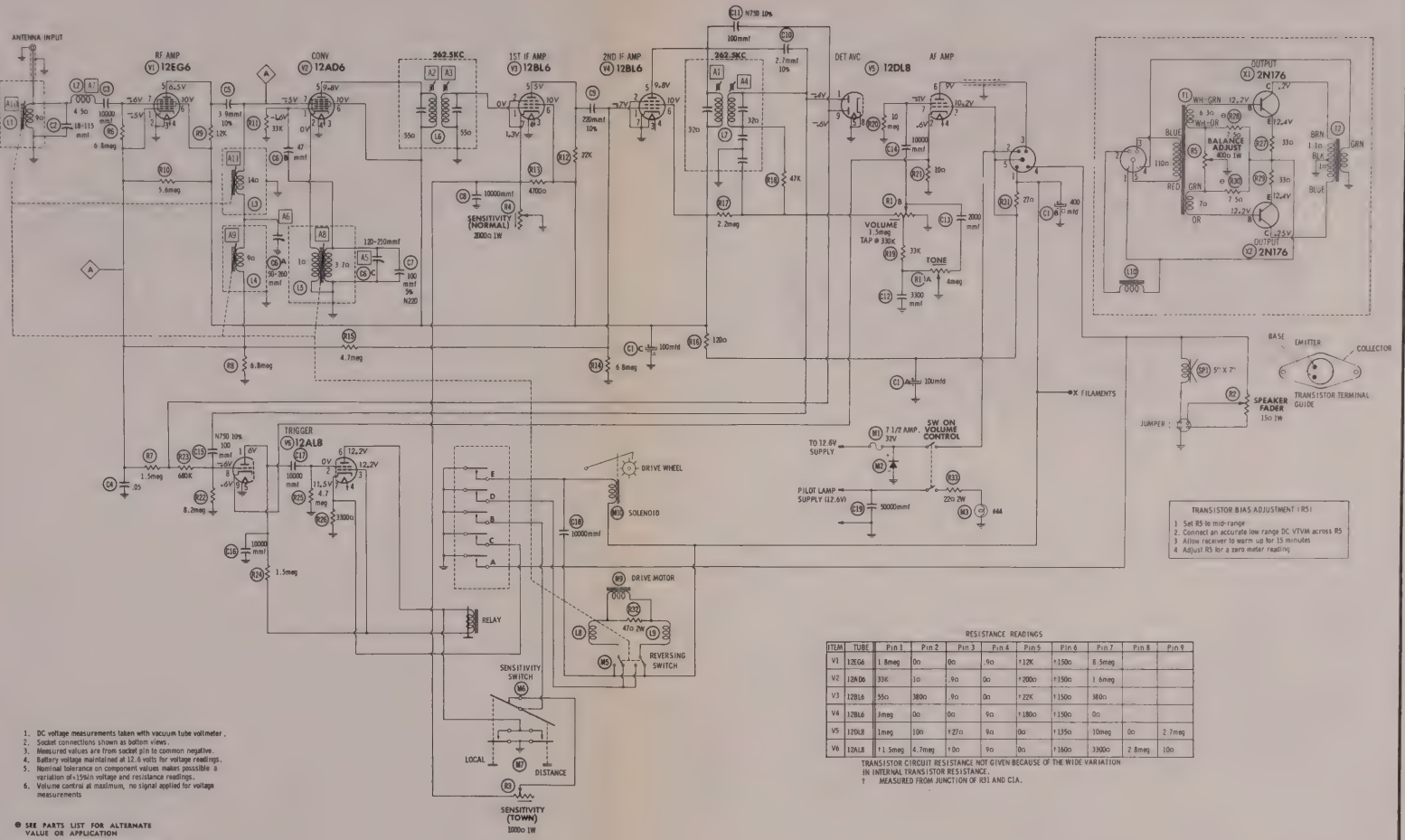
NAME	PART NO.	DESCRIPTION
Knob	1V540099	Volume and tuning
Knob	36C539088	Tone and speaker
Pushbutton	1B540078	5 Used
Pushbutton	1K560526	Search Selector, Distant
Pushbutton	1K560525	Search Selector, Local
Pointer	1A539632	Includes Stud Ass'y.
Dial Scale	34C539142	

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire	Use BELDEN No. 8885
Bonding Strap	Use BELDEN No. 8661

POWER CHASSIS





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12EG6	1.8meg	0Ω	0Ω	9Ω	†12K	†150Ω	8.5meg		
V2	12AD6	33K	1Ω	.9Ω	0Ω	†200Ω	†150Ω	1.6meg		
V3	12BL6	55Ω	380Ω	.9Ω	0Ω	†22K	†150Ω	380Ω		
V4	12BL6	3meg	0Ω	0Ω	9Ω	†180Ω	†150Ω	0Ω		
V5	12DL8	1meg	10Ω	†27Ω	9Ω	0Ω	†135Ω	10meg	0Ω	2.7meg
V6	12AL8	†1.5meg	4.7meg	†0Ω	9Ω	0Ω	†160Ω	3300Ω	2.8meg	10Ω

TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.
† MEASURED FROM JUNCTION OF R31 AND C1A.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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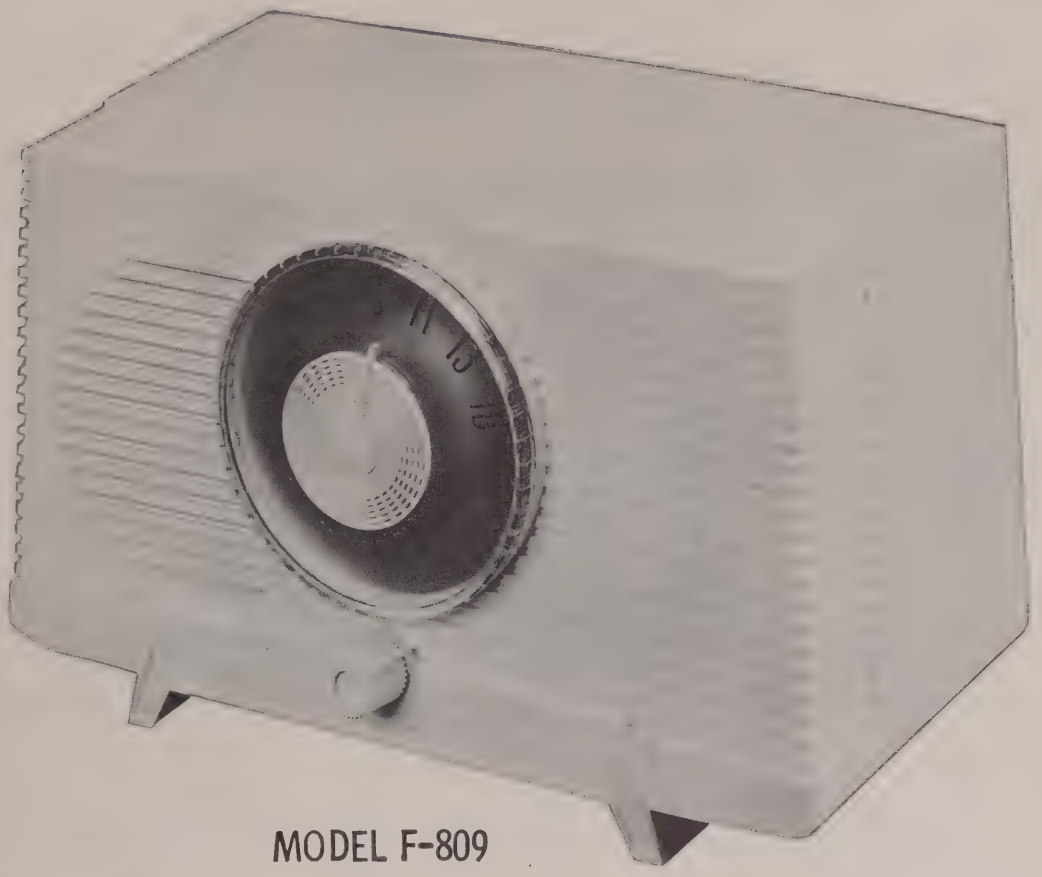
PHILCO MODELS
F-743, F-750, F-752, F-754,
F-758, F-809, F-813, F-815, F-817

PHILCO MODELS
F-743, F-750, F-752, F-754,
F-758, F-809, F-813, F-815, F-817



MODEL F-809

TRADE NAME	Philco Models F-743, F-750, F-752, F-754, F-758 (Clock Models); F-809, F-813, F-815, F-817
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	AC Operated AM Receiver
TUBES (Five)	Types 12BE6 Converter, 12BA6 IF Amplifier, 12AV6 Det. - AVC - AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles
RATING	.29 Amp. @ 117 Volts AC (27 Watts)
TUNING RANGE—BROADCAST	540 - 1620KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	600KC	600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1620KC	1620KC	"	A6	Insert a .006 nonmetallic shim between stator & rotor of tuning cap. Close gang. Remove shim. Adjust for maximum output.
4.		"	1500KC	1500KC	"	A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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H510

SET 413 FOLDER 12

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Converter	12BE6	
V2	IF Amplifier	12BA6	
V3	Det.-AVC-AF Amp.	12AV6	
V4	Output	50C5	
V5	Rectifier	35W5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	30	150	30-2585-2	PRS150V303020	BBRT32V215	TCT3113	TDLT-2	FMT-1530	R2380 *
B	▲25	150							
C	■20	150							

* Non Catalog Item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.047	400	30-4650-45	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C3	7.5		30-1224-83						N2200
C4	47		62-047009001	SI 47	D6-470	LT6Q47	UC-5447	5GA-Q47	
C5	10000		30-1238-2	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C6	.047	400	30-4650-45	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	①

① Clock versions use Part #30-4650-62.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	500K	½	33-5575-7					Volume & Switch Note 1.

Note 1. Clock versions use Part #33-5575-8.

RESISTORS

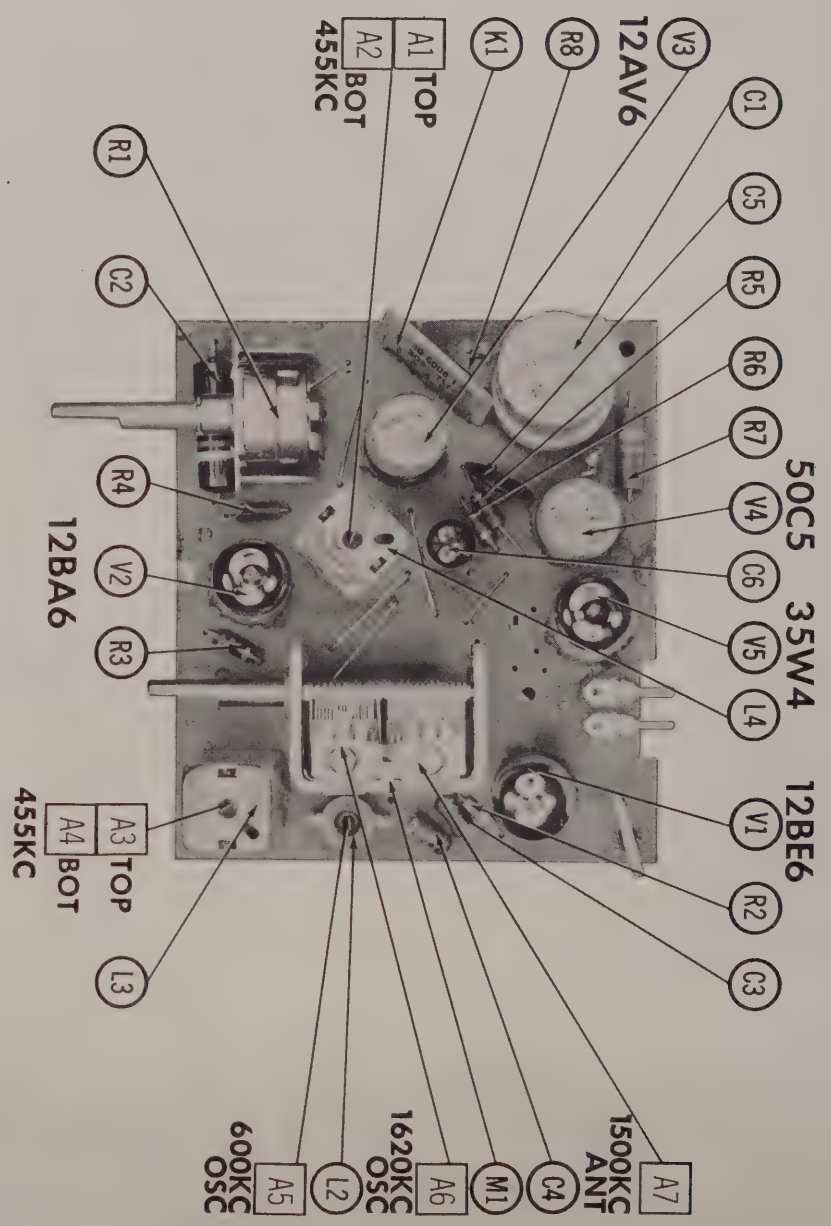
All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	PHILCO PART No.	NOTES
R2	22K		66-3228340	
R3	68Ω		66-0688340	
R4	2.2meg		66-5228340	
R5	150Ω		66-1158340	
R6	150Ω		66-1158340	
R7	220Ω	1	66-1224340	
R8	1000Ω		66-2108340	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2400Ω	3-4Ω	32-8384-2 ①	Z1101	A-3025	AU-605	A-3332	24S53	S-12X	① Part #322-0054 used in Model F-817

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PHILCO PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	36-1655-8	4A07	① Used in Model F-758 only.
SP2	4"	PM	3-4Ω	36-1671-1 ①		② Used in Model F-817 only.
SP3	4"	PM	3-4Ω	36-1655-3 ②	4A07	
SP4	4"	PM	3-4Ω	36-1655-3 ②	4A07	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		PHILCO PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Antenna	76-11130-2					Model F-743 ①
	Loop Antenna	76-10106-3					Model F-750 ①
	Loop Antenna	76-10106-2					Model F-752 ①
	Loop Antenna	76-11532					Model F-754 ①
	Loop Antenna	76-11536-1					Model F-758 ①
	Loop Antenna	76-10123-1					Model F-809 ①
	Loop Antenna	76-11145-1					Model F-813 ①
	Loop Antenna	76-11176-1					Model F-815 ①
	Loop Antenna	76-11151-1					Model F-817 ①
L2	Osc. Coil	32-4693-7					
L3	Input IF	32-4583-10	16-6780	BC-356	13-PC1	RF-4	
	Input IF	32-4583-17	16-6780	BC-356	13-PC1	RF-4	Used in Clock versions.
L4	Output IF	32-4583-11	16-6780	BC-357	13-PC2	RF-4	
	Output IF	32-4583-17	16-6780	BC-357	13-PC2	RF-4	Used in Clock versions.

① Includes cabinet back.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILCO PART No.	REPLACEMENT DATA
K1	Audio Coup. Net.	5000mmf, 250mmf, 5000mmf, 220mmf, 470K, 470K, 6.8meg	30-6006-1	Aerovox PA-113-2 Centralab PC-151 Cornell-Dubilier 116TM2 Sprague DT-2

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M1	Tuning Cap.	31-2783-1	Ant. 20-353mmf
	Tuning Cap.	31-2783-5	Models F-754, F-758
	Lamp	34-2068	Models F-815, F-817, F-754, F-758
	Printed Board	54-6280-5	Models F-809, F-813, F-750
	Printed Board	54-6280-6	Models F-815, F-817
	Printed Board	54-6280-3	Models F-754, F-758
	Printed Board	54-6280-4	Models F-743, F-752
	Clock	40-2066-3	Model F-743
	Clock	41-2068	Model F-750 Code 124
	Clock	41-2069-1	Model F-750 Code 126
	Clock	41-2066-6	Model F-752
	Clock	41-2066-4	Model F-754
	Clock	41-2066-5	Model F-758

PARTS LIST AND DESCRIPTIONS (Continued)

CABINETS & CABINET PARTS

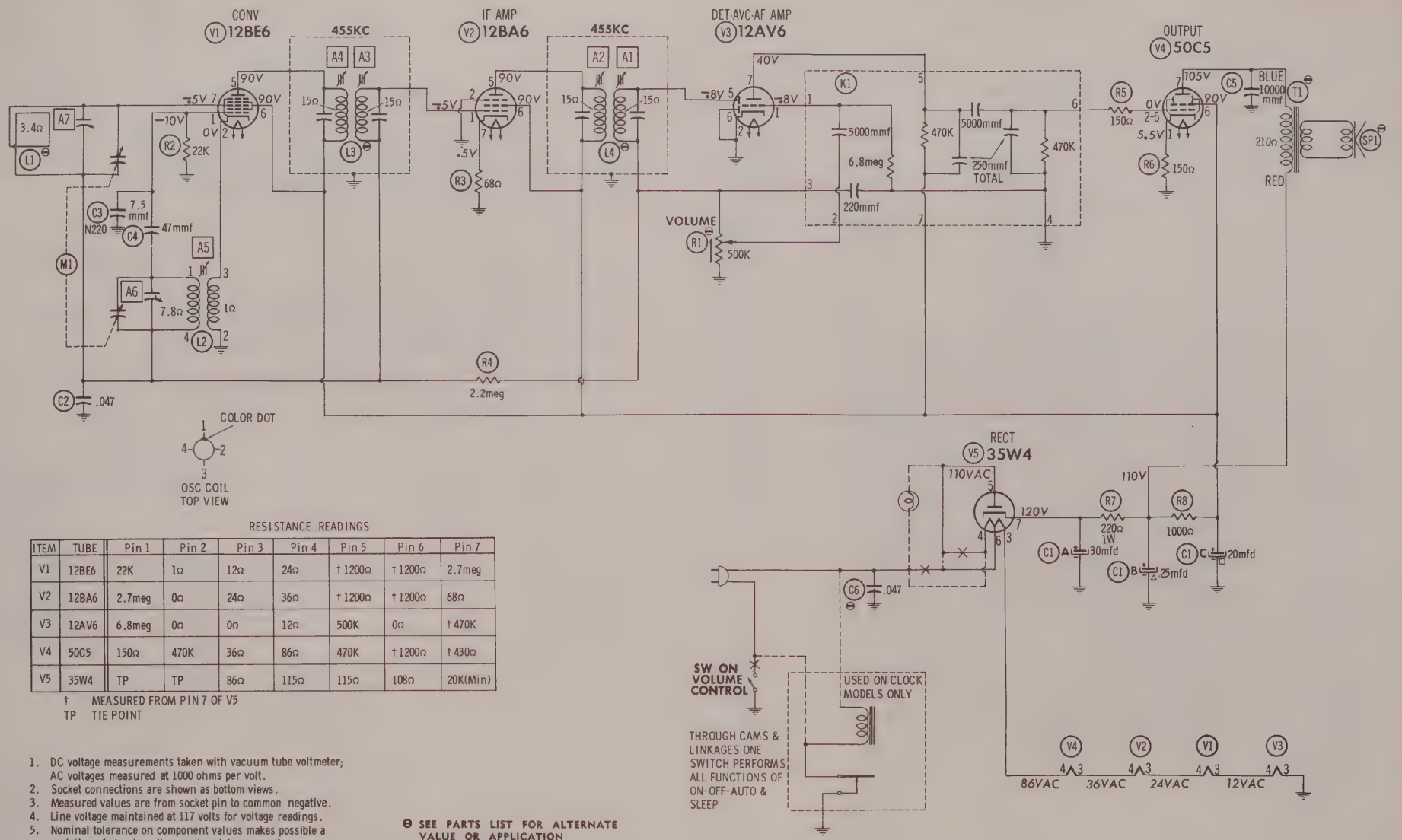
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Bezel	28-11337-1	Cabinet F-817
Bezel	28-11433	Cabinet F-815
Bezel	28-11344-2	Cabinet F-813
Knob	54-6282-3	Tuning, Model F-809
Knob	54-6313-1	Volume, Model F-809
Knob	54-6220-4	Tuning, Model F-813
Knob	54-6035-6	Volume, Model F-813
Knob	54-6282-2	Tuning, Model F-815
Knob	54-6313-3	Volume, Model F-815
Knob	54-6282-1	Tuning, Model F-817
Knob	54-4986-4	Volume, Model F-817
Knob	54-6289-1	Clock, Model F-743
Knob	54-6292-2	Tuning, Model F-743
Knob	54-6421	Volume, Model F-743
Knob	28-11986	Time Set, Model F-750
Knob	54-6156-17	Tuning, Model F-750
Knob	54-6313-1	Volume, Model F-750
Knob	54-6435-1	Clock, Model F-750
Knob	54-6436-1	Clock, Models F-752, F-754, F-758
Knob	54-6156-18	Tuning, Model F-752
Knob	54-6313-3	Volume, Models F-752, F-758
Knob	54-6426-1	Tuning, Grey Model F-754
Knob	54-6426-2	Tuning, Model F-754
Knob	54-6427-1	Volume, Grey Model F-754
Knob	54-6427-2	Volume, Model F-754
Knob	54-6282-2	Tuning, Model F-758
Cabinet	11269	Mahogany, Model F-809
Cabinet	11269-1	Lustre, Ivory, Model F-809
Cabinet	11190-3	Mahogany, Model F-813
Cabinet	11190-2	Pink, Model F-813
Cabinet	11190-4	Yellow, Model F-813
Cabinet	11198-5	Lustre, Ivory, Model F-815
Cabinet	11198-6	Grey, Model F-815
Cabinet	11198-4	Flame, Model F-815
Cabinet	11191-1	Turquoise, Model F-817
Cabinet	11191-2	Mahogany, Model F-817
Cabinet	11192-2	Pink, Model F-743
Cabinet	11192-1	Lustre, Ivory, Model F-743
Cabinet	11263	Model F-750
Cabinet	11263-1	Turquoise, Model F-752
Cabinet	11263-2	Lustre, Ivory, Model F-752
Cabinet	11263-3	Pink, Model F-752
Cabinet	11259	Grey, Model F-754
Cabinet	11259-1	Lustre, Ivory, Model F-754
Cabinet	11262	Turquoise, Model F-758
Cabinet	11262-3	Pink, Model F-758
Dial	54-5295	Model F-809
Window	54-6312-1	Light, Model F-817
Window	54-6341-1	Light, Model F-815
Crystal	54-6290-2	Clock, Model F-743
Crystal	54-6434-1	Clock, Model F-750
Dial	54-5287-1	Clock, Radio, Model F-750
Clock Crystal	54-6434-2	Model F-752
Clock Crystal	54-6428	Model F-754
Clock Crystal	54-6430	Model F-758

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord (Interlock Type) ..... Use BELDEN No. 8874



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	1Ω	12Ω	24Ω	†1200Ω	†1200Ω	2.7meg
V2	12BA6	2.7meg	0Ω	24Ω	36Ω	†1200Ω	†1200Ω	68Ω
V3	12AV6	6.8meg	0Ω	0Ω	12Ω	500K	0Ω	†470K
V4	50C5	150Ω	470K	36Ω	86Ω	470K	†1200Ω	†430Ω
V5	35W4	TP	TP	86Ω	115Ω	115Ω	108Ω	20K(Min)

† MEASURED FROM PIN 7 OF V5
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

SILVERTONE
MODEL 8220 (Ch. 528.53140)

SILVERTONE
MODEL 8220 (Ch. 528.53140)

SILVERTONE
MODEL 8220 (Ch. 528.53140)

TRADE NAME	Silvertone Model 8220 (Ch. 528.53140)
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volts DC
RATING	8.7MA @ 9 Volts DC
TUNING RANGE—BROADCAST	535-1630KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to (base) of 2N212 (X1). Low side to B—	455KC (400∿ Mod.)	Tuning gang fully open.	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001mfd to reduce hum modulation.
2.		Loop	1600KC	1600KC	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	600KC	600KC	"	A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 and 3.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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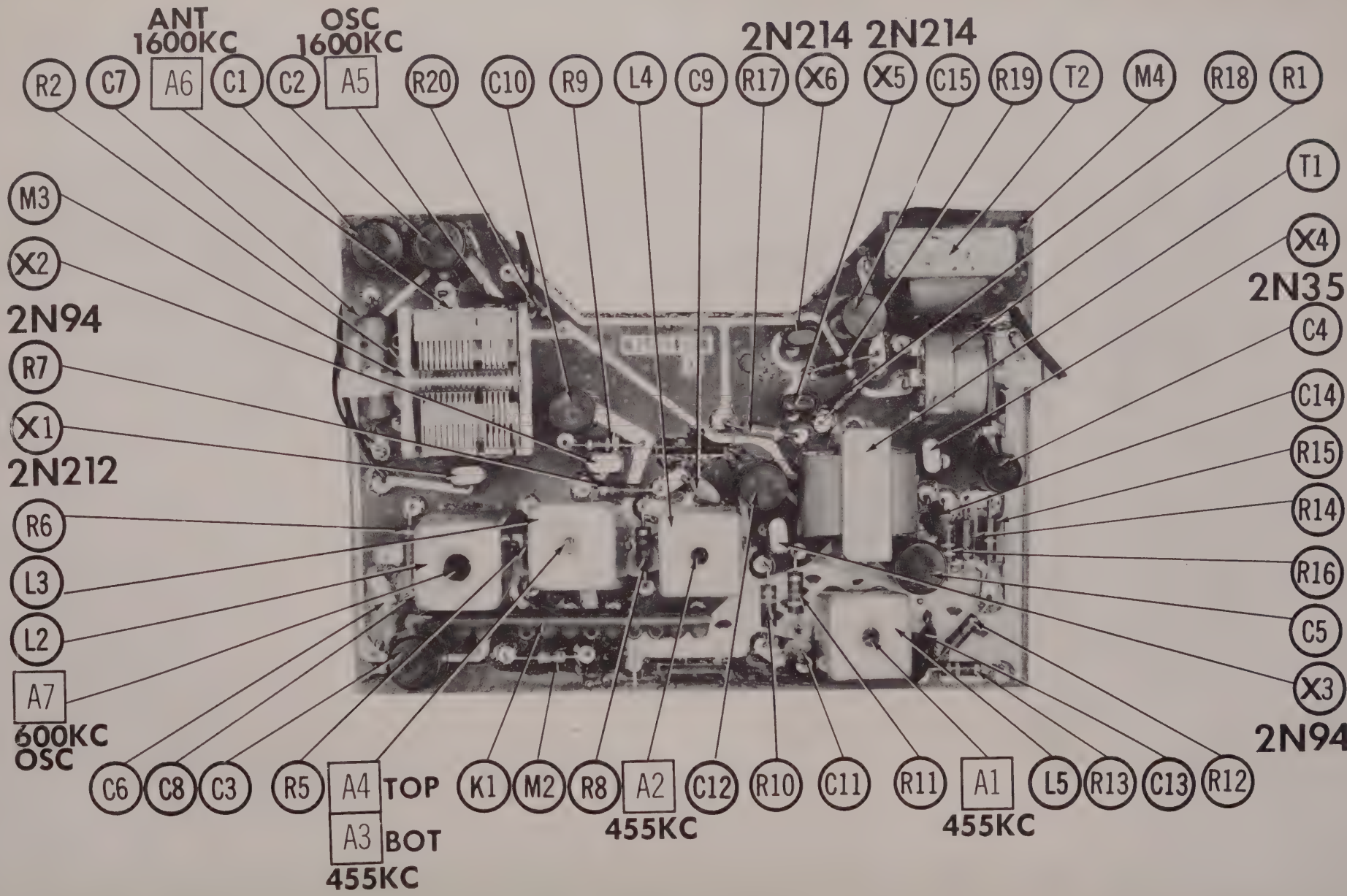
H451

SET 413 FOLDER 13



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N212	Converter					
X2	2N94	1st IF Amplifier		2N139			
X3	2N94	2nd IF Amplifier					
X4	2N35	Driver					
X5	2N214	Output					
X6	2N214	Output					

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Silvertone PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	50	15	18-61-5	XPP15050	BBR50-25	TT15X50	ML50-15		TE-1160
C2	50	15	18-61-5	XPP15050	BBR50-25	TT15X50	ML50-15		TE-1160
C3	50	15	18-61-5	XPP15050	BBR50-25	TT15X50	ML50-15		TE-1160
C4	6	15	18-60-5	XPP15006	NL6-25	TT25X5	ML6-15	MMT-0505	TE-1153
C5	50	15	18-61-5	XPP15050	BBR50-25	TT15X50	ML50-15		TE-1160

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	25-52		19-187-0						
C7	.05	12	20-57-1	P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C8	5000		15-50216	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C9	39		15-390111	NP0-DI39	DTZ-39	C10Q39C			10% NP0
C10	.047	200	20-56-1	P288N-047	DF-503	BC2S47J	ACE6147	2SE-S47	
C11	3.3		15-339111	NP0-DI3.3	DTZ-3R3	C10V33C	ZT-5533	5TCCB-V33	NP0
C12	.047	200	20-56-1	P288N-047		BC2S47J	ACE6147	2SE-S47	
C13	20000		15-20317	BPD-02	DD-203	BYB6S2		5HK-S2	
C14	1000		15-10216	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C15	.047	200	20-56-1	P288N-047		BC2S47J	ACE6147	2SE-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Silvertone PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2500Ω	½	24-282-0					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Silvertone PART No.	NOTES
	OHMS	WATT		
R2	5600Ω		60-56201	
R3	6800Ω		60-68201	Note 1
R4	100K		60-10401	Note 1
R5	100K		60-10401	
R6	1500Ω		60-15201	
R7	1000Ω		60-10201	
R8	68K		60-68301	
R9	470Ω		60-47101	
R10	22K		60-22301	
R11	470Ω		60-47101	

ITEM No.	RATING		Silvertone PART No.	NOTES
	OHMS	WATT		
R12	1000Ω		60-10201	
R13	3300Ω		60-33201	
R14	2200Ω		60-22201	
R15	22K		60-22301	
R16	470Ω		60-47101	
R17	4700Ω		60-47901	
R18	100Ω		60-10101	
R19	10Ω		60-10001	
R20	220Ω		60-22101	

Note. 1 Not used in some versions.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Silvertone PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.5	:1	80-23-1							

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Silvertone PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	580Ω CT	3-4Ω	80-22-1							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Silvertone PART No.	QUAM PART No.	
SP1	3 1/2"	PM	3-4Ω	33-270-4	3A07	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		Silvertone PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Stick	82-130-1					Includes C6
L2	Osc. Coil	10-36-4					
L3	1st. IF	10-78-2					
L4	2nd IF	10-79-2					
L5	3rd. IF	10-80-2					Includes IN60 Det.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Silvertone PART No.	REPLACEMENT DATA
K1	RF-IF Circuitry	10000mmf, 10000mmf, 10000mmf 10000mmf, 47K, 1200Ω, 100K 3900Ω, 27K, 2200Ω	13-14-5	

BATTERIES

ITEM No.	VOLTAGE	Silvertone PART No.	REPLACEMENT DATA				NOTES
			BURGESS "A-B" Pack	EVEREADY "A-B" Pack	MALLORY "A-B" Pack	RAY-O-VAC "A-B" Pack	
M1	9V	57-6419	D6	No. 276	M-1603	1603	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		Silvertone PART No.	CBS PART No.	SYLVANIA PART No.	
M2	IN60	83-1192	IN60	IN60	Detector

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

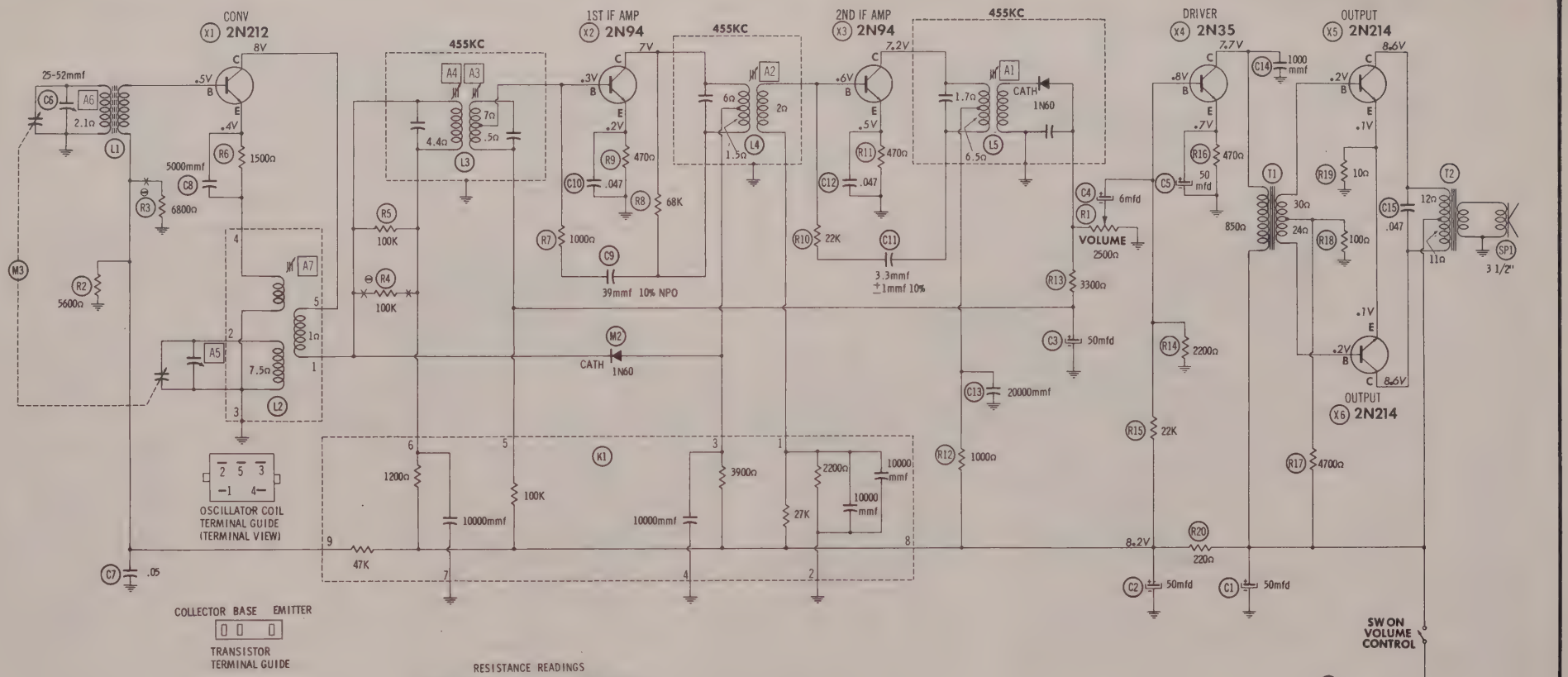
NAME	PART NO.	DESCRIPTION
Knob	52-825-0	Antenna
Knob	52-818-0	Tuning
Knob	52-811-0	On-Off-Volume
Cabinet	42-18-1	

MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
M3	Tuning Cap.	19-62-2	2 Gang (Ant. 9-236mmf)

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors



RESISTANCE READINGS

ITEM	TYPE	BASE	EMITTER	COLLECTOR
X1	2N212	2900Ω	1500Ω	†1400
X2	2N94	5000Ω	470Ω	† 4100Ω
X3	2N94	1900Ω	470Ω	†1200Ω
X4	2N35	2000Ω	470Ω	†850Ω
X5	2N214	135Ω	10Ω	†12Ω
X6	2N214	130Ω	10Ω	†11

TRANSISTORS REMOVED FOR RESISTANCE MEASUREMENTS
† MEASURED FROM JUNCTION OF R20 AND C1

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

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EIA MEMBER

**WEBCOR MODELS
2811, 2821, 2891**

WEBCOR MODELS
2811, 2821, 2891

MODEL 2811

WEBCOR MODELS
2811, 2821, 2891

GENERAL INFORMATION

Webcor Models 2811, 2821, and 2891 tape recorders consist of two basic sections, (1) a tape transport mechanism, and (2) a record-playback amplifier.

These models have the same basic design and construction. Model 2811 is monaural; Model 2821, stereo; and Model 2891, radio.

The Webcor models have two speeds, 3 3/4 and 7 1/2 ips. Using both tracks, recording times are as follows:

Reel Size	3 3/4" Speed	7 1/2" Speed
5" (600 ft.)	1 hour	1/2 hour
7" (1200 ft.)	2 hours	1 hour

These models operate on 60 cycles, 105-120 volts AC only.

Manufactured by:

Webcor
5610 Bloomingdale Avenue
Chicago 39, Illinois

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C346

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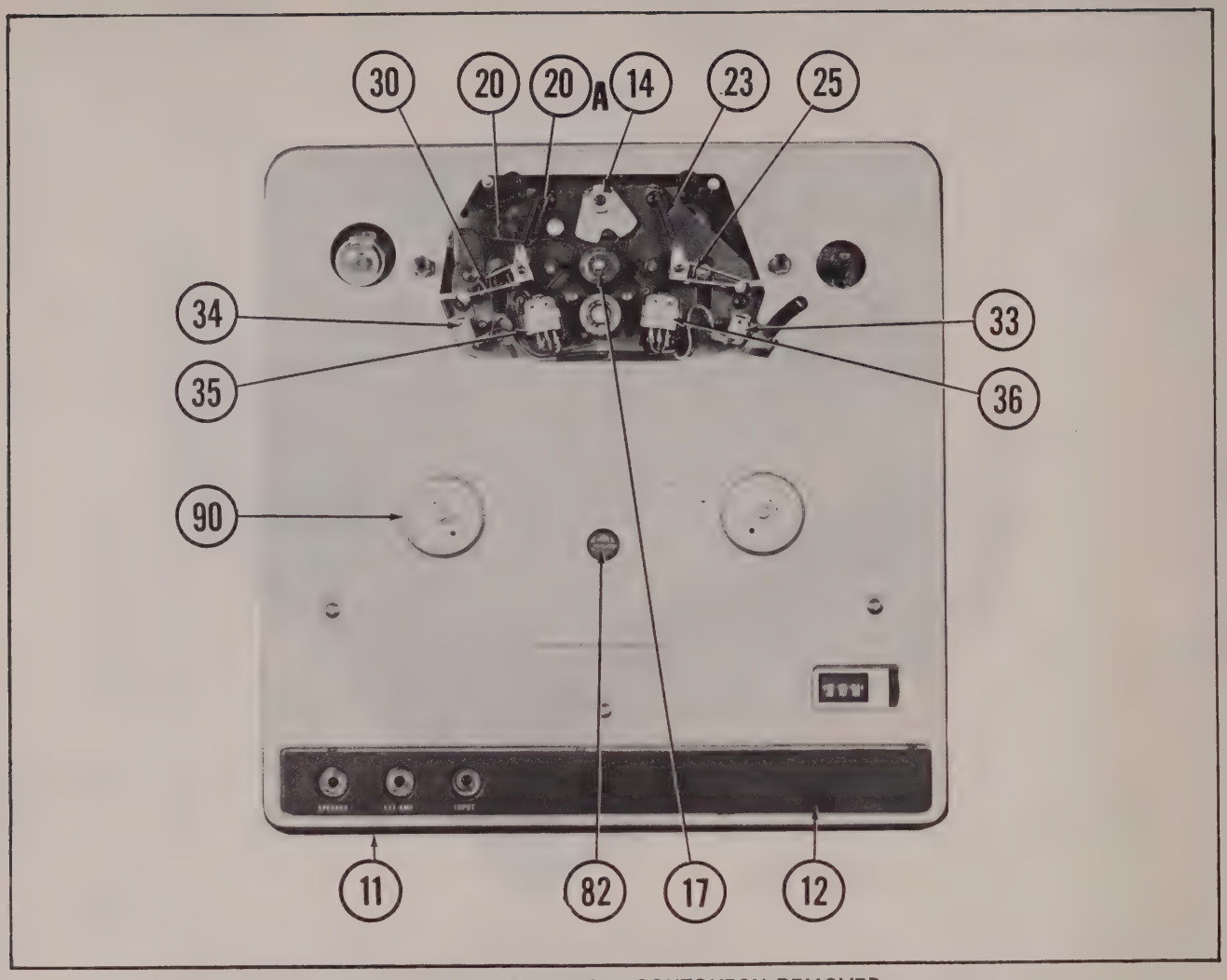


FIG . 1 TOP PLATE WITH ESCUTCHEON REMOVED

SPECIFICATIONS

Net Weight:

42 lbs.

Size:

10 1/8" x 17 1/2" x 16 1/2"

Power Consumption:

100 watts

Wow and Flutter:

Less than .4%

Frequency Response:

70 to 7,000 cycles ± 3 db at 3 3/4 ips
50 to 12,000 cycles ± 3 db at 7 1/2 ips

Signal to Noise Ratio:

45 db

Input Jack:

High impedance for microphone. Low impedance for direct recording from radio or phono.

Ext. Amp. Jack:

For other audio equipment.

Speaker Jack:

3.2 ohms for external speaker.

Ext. Amp. Jack (Model 2821):

For second channel of stereo sound system.

Remote Jack (Model 2821):

For "Aural Balance" remote control

AC Convenience Outlet (Model 2821):

To furnish power to amplifier in second sound system.

Recording Level Indicator:

Electron-ray tube indicating normal and over-load.

SPECIFICATIONS (CON'T)

Speakers:

5" x 7" oval woofer, 2.15-oz. Alnico-V magnet, 8-ohm V.C. impedance; 4" tweeter, 1.0-oz. Alnico-V magnet, 8-ohm V.C. impedance.

Microphone:

High-impedance, ceramic element.

Recording Heads:

Half-track, dual-purpose head for monaural; designed for low noise level with special hum-bucking circuits; mu-metal shielded. Co-linear (stacked) heads for stereo (Model 2821).

Output:

2 watts undistorted, 5 watts peak.

Motors:

(2) 4-pole, heavy-duty, electronically balanced.

Erase:

Electromagnetic, (60 kc)

Radio (Model 2891):

AM radio tuner with printed circuit.

CONTROL FUNCTIONS

Tape Counter

This counter permits locating any particular portion of a recorded tape. Rotate reset wheel toward rear of unit to set the dial to "000".

Recording Level Indicator

The "eye" shows proper sound level for record.

Volume Control and On-Off Switch

Rotating this control clockwise turns on unit. Further clockwise rotation increases volume level for either record or playback.

Tape Speed Adjustment

This control adjusts the tape speed to 3 3/4 or 7 1/2 ips. It may be turned to either position with a small coin.

Record-Playback Control

This is a combination control for "Recording", "Playback", "Rewinding", and "Fast Forward". The Record Safety button must be used with this control when recording.

OPERATING INSTRUCTIONS

Preparing Recorder for Operation

1. Set tape speed control to 3 3/4 or 7 1/2 ips. Webcor recording heads, except on the Model 2811, are designed for dual-track recording; one-half the tape width is recorded at a time.

2. Place full reel of tape on either hub with slot in reel hub fitting snugly over shaft key. Place empty reel on other hub in the same manner.

Note:
These recorders record in either direction without reel turnover.

3. To thread tape, unwind about 18" of tape from full reel placed on left hub. Slip tape into slot at left end of threading slot and hold in place to keep from slipping. Slide rest of tape into slot from left to right by feeding tape into slot while holding tape against back of slot opening. After tape is threaded through slot, make three or four turns around the empty reel.

Note:
With full reel on right hub, reverse the foregoing procedure.

4. Set tape counter to "000".

5 Turn off monitor control.

Note:
Be sure tape reels are wound with dull side of tape facing toward inside of reel. This is called an "A" wind.

How to Record from Microphone

1. Set Record-Playback control to "Stop".

2. Insert line cord plug into a 105-120 volt, 60-cycle AC outlet.

Caution:
Severe damage will result if connected to a direct current (DC) line.

3. Plug microphone into input jack.

4. Rotate Volume-On control clockwise to turn on unit. Before starting to record, allow amplifier sufficient time to warm up.

5. Adjust recording level by speaking into microphone in a normal tone of voice. Notice that the level indicator shows a "shadow" or dark segment at bottom of "eye". This "shadow" opens and closes as you speak. Now set volume control until the "shadow" barely closes on loudest sound. Overlap is caused by distortion; this overlap can be seen by the bright green line when the "shadow" closes.

6. To monitor a recording, rotate Tone-Monitor control counterclockwise until it clicks. If

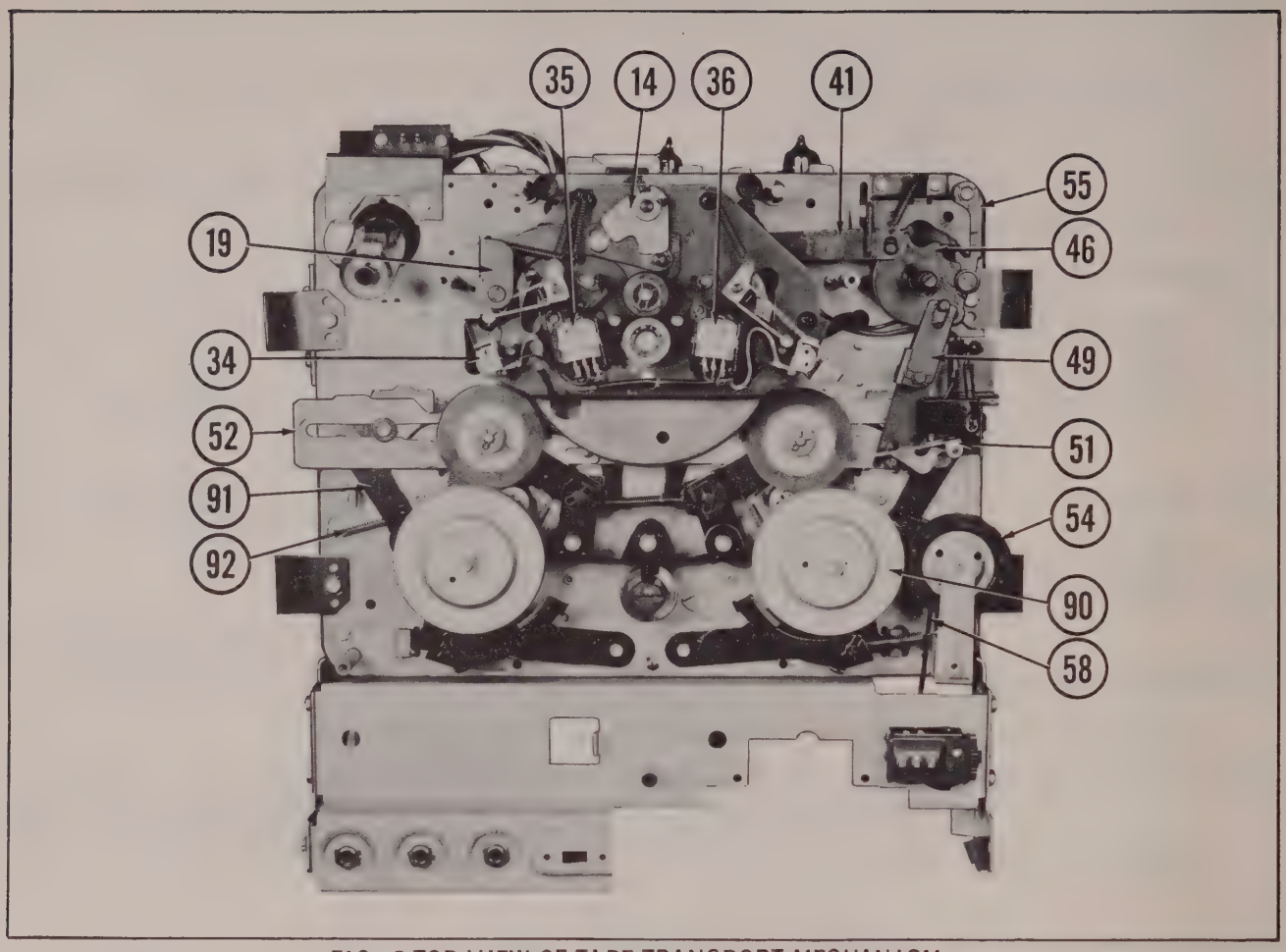


FIG. 2 TOP VIEW OF TAPE TRANSPORT MECHANISM

OPERATING INSTRUCTIONS (CON'T)

unit squeals, move microphone away from unit or rotate tone control counterclockwise to Bass.

7. Depress Record button and turn Record-Playback control to either Right or Left. If full reel of tape is on left shaft, turn knob to Right; if full reel is on right shaft, turn knob to Left.

8. Move Record-Playback control to "Stop" after recording is finished.

Note:

When recording with monitor "On", tonal quality of monitor can be adjusted to suit the operator. However, the tone control does not affect the tonal quality of the tape being recorded, because record characteristics are preset at the factory.

How to Play a Recording

1. Turn Record-Playback control to Right or Left as necessary. (Be sure "R" (record) button is not pressed, or recording will be erased).

2. Set Tone and Volume controls for desired listening level.

Note:

Tone control varies the treble and bass response of playback.

How to Record from Phono, Radio, or TV

1. Connect Webcor input cord No. 2927 between output of radio, phono or TV receiver to input of tape recorder.

2. To monitor recording, turn Tone-Monitor control "On" or counterclockwise from "Off" position.

3. Follow this same procedure to record from microphone.

4. A new recording on a tape already recorded can be made without going through the foregoing steps. Simply start recording, and this will automatically erase the old recording as the new one is being made.

5. A Recording may be made at the same time by following the recording instructions.

How to Use Recorder as a Public Address System

1. Set Record-Playback control to "Stop" position.

2. Connect microphone to input jack.

3. Turn on Tone-Monitor control.

4. Adjust Volume and Tone controls as desired.

Note:
If microphone feedback (squeal) occurs, move microphone away from speaker or adjust Volume or Tone control to eliminate squeal.

How to Use Recorder with External Speaker

Plug external speaker into output jack at front of recorder. (Output impedance is 8 ohms.)

How to Use Recorder with Another Recorder

1. To record from another recorder, use Webcor No. 2943 input-output cord. Connect cord from auxiliary recorder output to recorder input. Auxiliary recorder must be set to "Play". Turn volume control of auxiliary recorder to fairly high volume, but not so high that distortion is caused. If sound is "mushy" gradually turn down volume until distortion clears.

2. Adjust Volume control of recorder (the unit making the recording) to proper level.

3. Follow standard recording and playback procedure.

How to Use Recorder with External Amplifier

1. Connect Webcor output cord No. 2928 from Ext. Amp. Jack of recorder phono or auxiliary input of external amplifier.

2. Follow same procedure for playback as previously described.

Note:
External amplifier jack at rear of recorder provides cathode-follower output at a level of 1 1/2 volts maximum.

How to Use Fast Rewind

To fast rewind, depress Record-Playback control and turn to either Right or Left position. Do not depress "R" (record) button, or the recording will be erased.

How to Erase a Recording

1. Thread tape to be erased.

2. Set Volume control as low as possible.

3. Depress "R" button and turn wing knob to proper position. Recording heads will now erase the tape completely.

MECHANICAL TROUBLESHOOTING

If trouble encountered with a recorder is not known, the "Operating Instructions" should be performed completely while referring to "Function of the Controls". From this procedure, it can be determined if the trouble is mechanical, electrical, or possibly both. If improper operation to tape transport mechanism is noted, refer to the sample list of troubles and possible causes. Normal tape transport action is possible while electrical trouble could prevent proper recording or playback.

Checking Tape Speed

A marked variation from normal tape speed could indicate worn idler wheels or a need for lubrication. Since it is impractical to check the tape speed directly, because the reel speed varies with the amount of tape wound, the capstan speed (which controls the tape speed) is checked. The capstan speed should be checked under normal tape load in Record or Playback. Normal capstan speed should be 152 to 159 rpm with speed selector at 7 1/2 ips, or 76 to 80 rpm with speed selector at 3 3/4 ips. It will be found much easier to check rpm at 3 3/4 ips. A method of checking capstan speed is to secure a small strip of adhesived tape to the outer edge on top of capstan. With the second hand of a watch, the number of turns in one minute can then be easily counted.

A 1,200-foot, 7-inch reel of tape should fast wind in about 3 minutes. Variations in fast transport speed may be caused by normal clutch slippage.

Wow

Anything causing tape to pass record heads at varying speed will result in wow. This is a varying pitch or tinny sound, most noticeable when recording or playing back piano, organ, or slow passages of classical music. One way of checking for wow is to play back a prerecorded high-frequency test tape. Capstan and drum assembly, pressure roller, and idler wheels are manufactured to a close tolerance to assure a minimum of wow. Wow conditions are generally due to one or more of the following:

1. Contaminated capstan surface (70). Capstan surface must be free of oil and iron oxide particles. This surface should be dried throughly after applying alcohol.

2. Dirty capstan drum (70), pressure roller (17), idler wheels (86), or motor shaft. Use alcohol and a clean cloth, and wipe the driving surfaces.
(Do not use carbon tetrachloride to clean rubber surfaces.)

3. A worn or pitted pressure roller (17) should be replaced.

4. Pressure roller (17) should be parallel with capstan. If mounting shaft is bent, it should be straightened or replaced.

5. Pressure roller tension spring may be exerting insufficient tension. This would allow pressure roller (17) to be moved away from capstan with only light force applied. Pressure roller should contact capstan with a 2 to 2 1/4-lb. force. This may be checked with a spring scale.

6. If idler wheel (86) is tilted, bend the wheel arm until idler appears level to the eye.

Tape Squeal

After many hours of operation, a squeal or squeaking effect may be encountered. This generally

is caused by tape coating oxide accumulating on pressure pads, and possible compressing of pads. This, in turn, exerts excessive pressure on recording tape causing friction.

Tape that has been abused may cause an excessive accumulation of iron oxide particles to adhere to tape guides, pressure pads, or recording head. This resistance to smooth tape transport will cause a friction squeal. Usually, cleaning these components with alcohol or replacing them will correct the trouble.

Varying frictional forces can be a source of frequency modulation noise that may be introduced into the program when recording and playing back. This frequency modulation noise is most pronounced on high audio frequencies. The most common causes for this difficulty are:

1. Misaligned heads.
2. Dirty pressure pads, guides, or headpole pieces.
3. Excessive tape tension.
4. Worn or grooved guides or headpole pieces.
5. Pressure roller binding, hardened, or worn.
6. Excessive pressure pad pressure, or acute angle.

MECHANICAL ADJUSTMENTS

Pressure Roller

Pressure roller (17) should be parallel with capstan. With spring clip (15) removed, pressure roller should not climb up capstan. If it is not parallel, a close-fitting pipe may be inserted over the pressure roller shaft to supply leverage for bending it. Pressure roller may also be moved up on its shaft to provide a holding surface for binding. Care must be taken not to nick the shaft.

Idler Wheel (86)

Idler wheel (86) should contact flywheel of capstan assembly (70) squarely. With tape speed selector set to 3 3/4 ips, idler wheel (86) should contact small diameter portion of motor shaft. If idler wheel is too low, it will rub on large diameter of motor shaft. Idler wheel arm can be re-formed to place idler wheel in correct position. The number of washers under idler wheel may be varied to prevent vertical play.

Pressure Pad

Pressure pads must clear erase head housing and rest firmly and freely against the pole pieces. Pressure pad arms are made of soft metal and can easily be formed to properly position the pads against the pole pieces. The pads may be replaced by carefully pulling them from pad arms and inserting new pads, using household cement to secure them.

Clutch Assembly

Clutch and brake drum assembly (90) cannot be adjusted. If excessive slippage occurs, the worn part should be replaced.

ELECTRICAL ADJUSTMENTS

Head Alignment

To peak record-playback heads (35) and (36), the following equipment is required:

1. Phillips head screwdriver.
2. 6,500-cycle prerecorded tape.
3. VTVM

Set VTVM to 10 volts AC scale and connect to "Output" receptacle of recorder. Turn speed selector to 7 1/2 ips. Turn Volume and Tone controls to maximum.

Place recorder in either "Left" or "Right" "Play" position, depending on which head is to be aligned first. Insert Phillips head screwdriver in adjustment screw and adjust for maximum meter reading.

With magnetic tape recorders, high-frequency response is extremely sensitive to the alignment of recording head, and of contact between tape and recording head.

For standardization purposes, an attempt is made to align the head gaps exactly perpendicular to the tape.

This alignment is accomplished by tilting the heads for maximum output from a prerecorded alignment tape upon which a steady 6,500-cps signal is available.

If the reproducing gaps are not parallel to the recording poles, serious loss of high frequencies and track overlap may result.

Recording Level Indicator

The "eye" tube indicates when proper signal level is being applied to the recording head. If this circuit is not adjusted correctly or not operating properly, it will cause an incorrect signal level to be applied to the recording head, resulting in a weak recording or an overdriven distorted recording. The "eye" is adjusted as follows:

1. Connect leads of No. 2927 input cord to output lugs of an audio generator and insert into input jack of recorder.
2. Connect a 3-4 ohm noninductive 25-watt resistor to leads of a No. 2928 output cord or to an ordinary microphone plug. Insert plug into output jack of recorder.
3. Set Tone control to Monitor position; set speed control to 7 1/2 ips.

4. Set audio generator to 1 kc (sine wave). Adjust output control of generator until a reading of 1 volt is obtained with a VTVM at output lugs of audio generator.

5. Turn Volume control until a reading of 1-volt AC is obtained across the 3-4 ohm resistor.

6. Adjust "eye" control (R4) until "eye" just closes.

Note:

This adjustment depends on the condition of the 12AB5 tubes and their associated components. Therefore, this circuit should be checked before making this adjustment.

LUBRICATION

When required, as indicated by binding or other abnormal operation, lubricate points indicated on Exploded Views (Figure 3B). Points indicated by a dot (●) should be lubricated with a drop or two of No. 10 light sewing machine oil. Points indicated by a square (■) should be lubricated with a high-temperature grease of medium consistency. The basic rule is—do not overlubricate. Oil and grease must be kept off all rubber idlers, belts, and periphery of flywheel and any parts that might transfer oil or grease to them. Always wipe excess lubricate from parts that have been lubricated.

CLEANING

Most defects, other than wear or breakage, can be traced to dirty surfaces. Recording heads, capstan, and pressure roller accumulate tape coating residue, worn off tape as it passes these parts. This accumulation should be removed periodically since it may cause faint recording and poor playback. Wipe these surfaces carefully with a clean cloth. If dirt is caked or hard and will not come off with a dry cloth, dampen cloth slightly with carbon tetrachloride. Do not use carbon tetrachloride on any rubber parts. If dirt cannot be removed from rubber parts, they should be replaced.

TROUBLE CHART

Trouble	Possible Cause
Take-up reel fails to rotate in "Play" or "Record".	1. Brake shoe assemblies (62) or (95) operating improperly. 2. Faulty clutch assemblies (90). 3. Binding or bent take-up reel shaft. 4. Defective motors.
Counter does not register.	1. Tape counter belt (58) broken. 2. Reset wheel binding on top plate.
Erratic tape speed.	1. Oil or grease on motor pulleys, idler wheels (86), capstan drum (70), or pressure roller (17). 2. Worn idler wheels (86). 3. Brake shoe assemblies (62) or (95) not releasing properly. 4. Capstan assembly (70) binding. 5. Clutch and brake drum (90) binding. 6. Bent or binding motor shaft. 7. Motor bearing needs oil. 8. Tension spring (72) too weak to hold idler wheels (86) in good contact with motor pulley and capstan drum (70).
Motor fails to operate.	1. Defective motor. 2. Bent or binding motor shaft. 3. Motor bearing needs oil.

TROUBLE CHART (CON'T)

Trouble	Possible Cause
Pressure roller (17) fails to engage capstan in "Play" or "Record".	1. Loose set screws in pressure roller cam (14). 2. Binding pressure roller arm assembly (19).
Erase head pads (24A) or (29A) fail to move properly in "Stop", "Play", or "Record".	1. Tension springs (23), (25), or (28) missing, disconnected, or broken. 2. Binding pressure arm and erase pad assemblies (27) or (31).
Capstan fails to rotate in "Play" and "Record", but motors operate.	1. Tension spring (72) broken or disconnected. 2. Oil or grease on motor shaft ends, idler wheels (86), and capstan drum (70).
Motors operate only in "Stop" and "Rewind".	1. Capstan shaft or drum (70) bent and binding.
Supply reel spills tape when Record-Playback control is turned to "Stop".	1. Worn brake pad on brake shoe assemblies (62) or (95).
Fails to "Fast Rewind".	1. Oil or grease on motor pulleys and clutch drive wheels (90F). 2. Brake shoe assemblies (62) or (95) operating improperly. 3. Motors not operating.

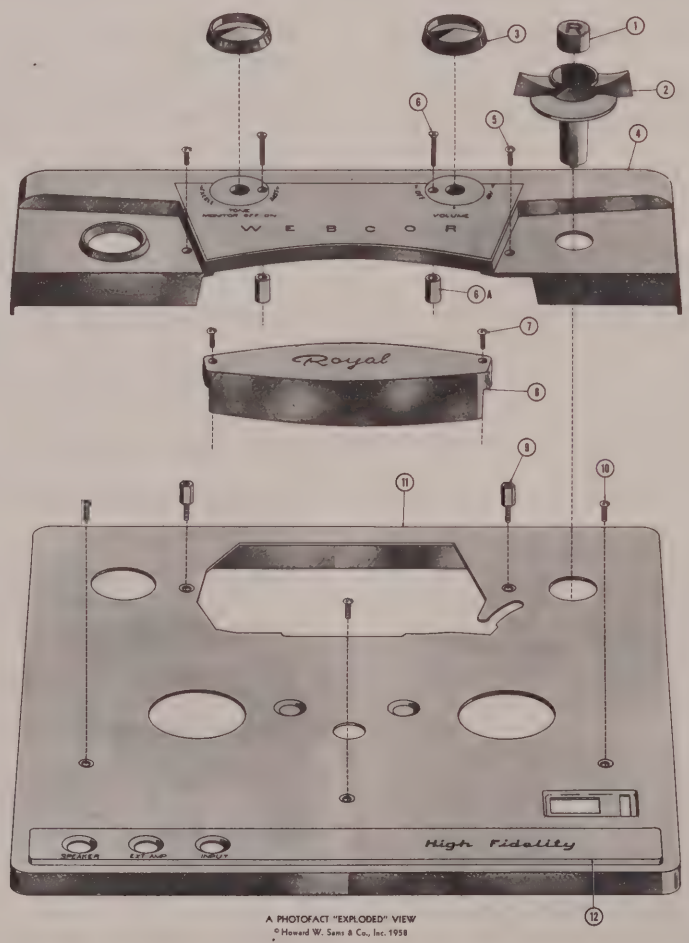


FIG. 3A EXPLODED VIEW OF PARTS ABOVE TOP DRESS PLATE

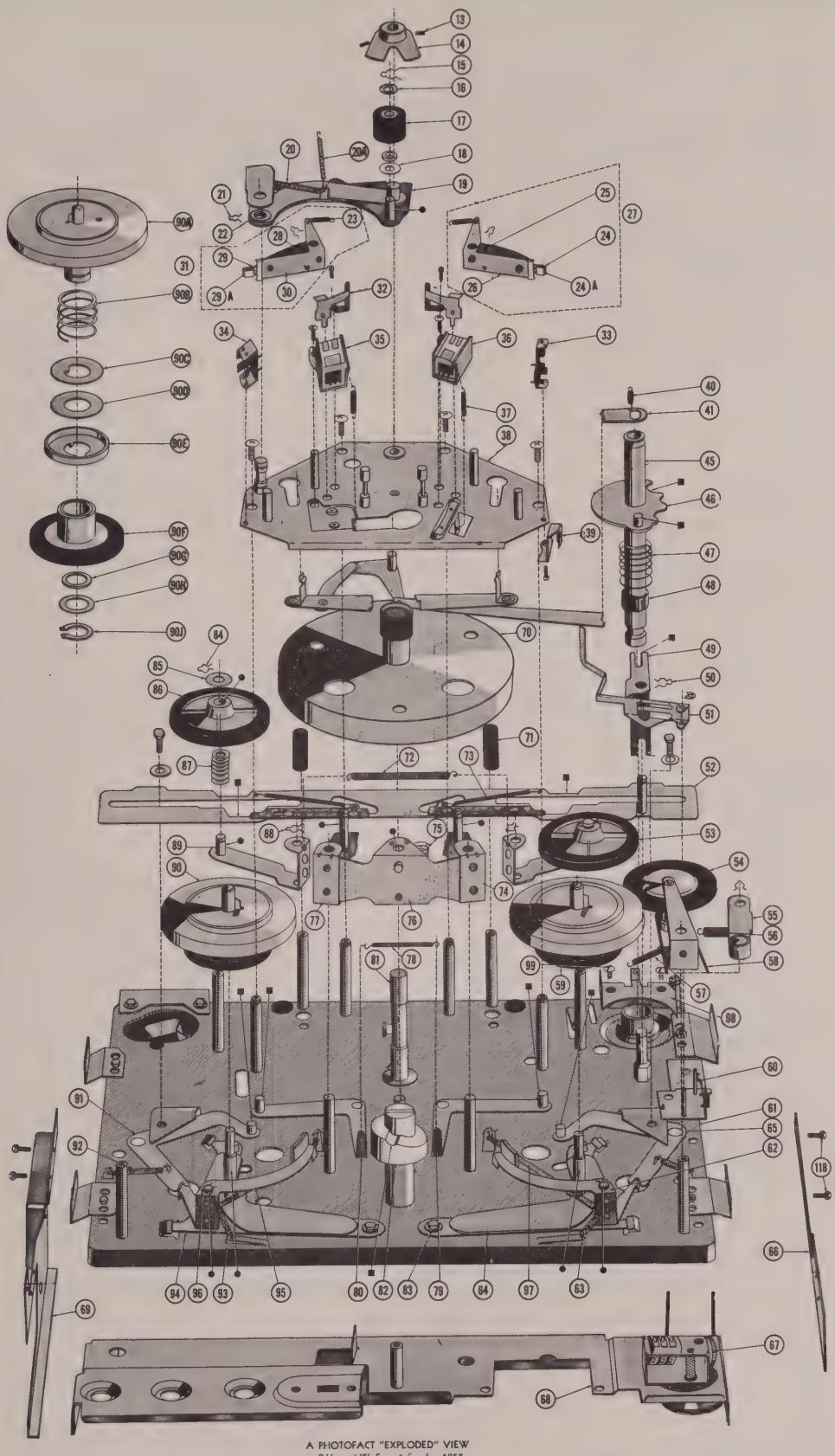
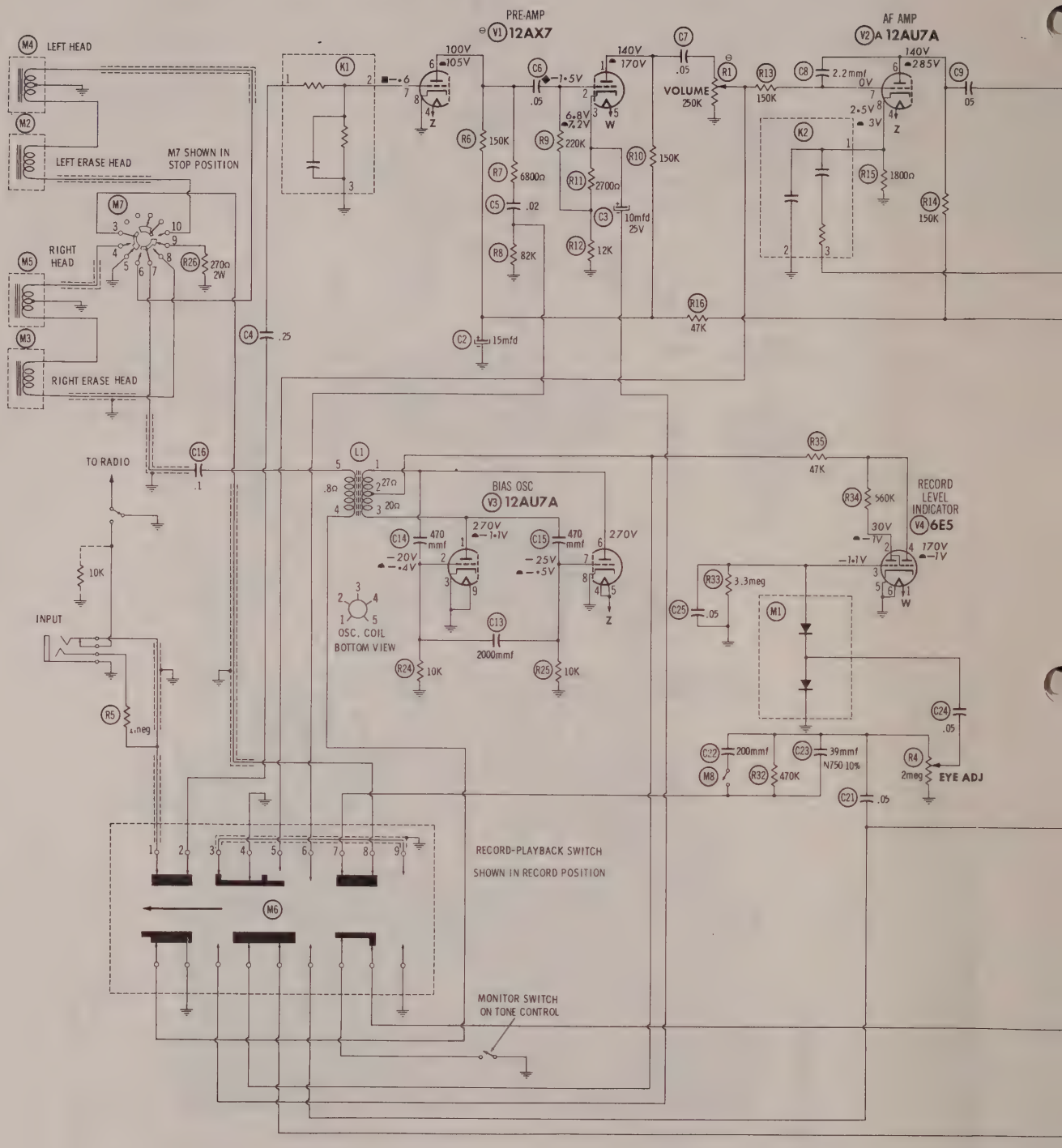


FIG. 3B EXPLODED VIEW OF PARTS ABOVE BASEPLATE



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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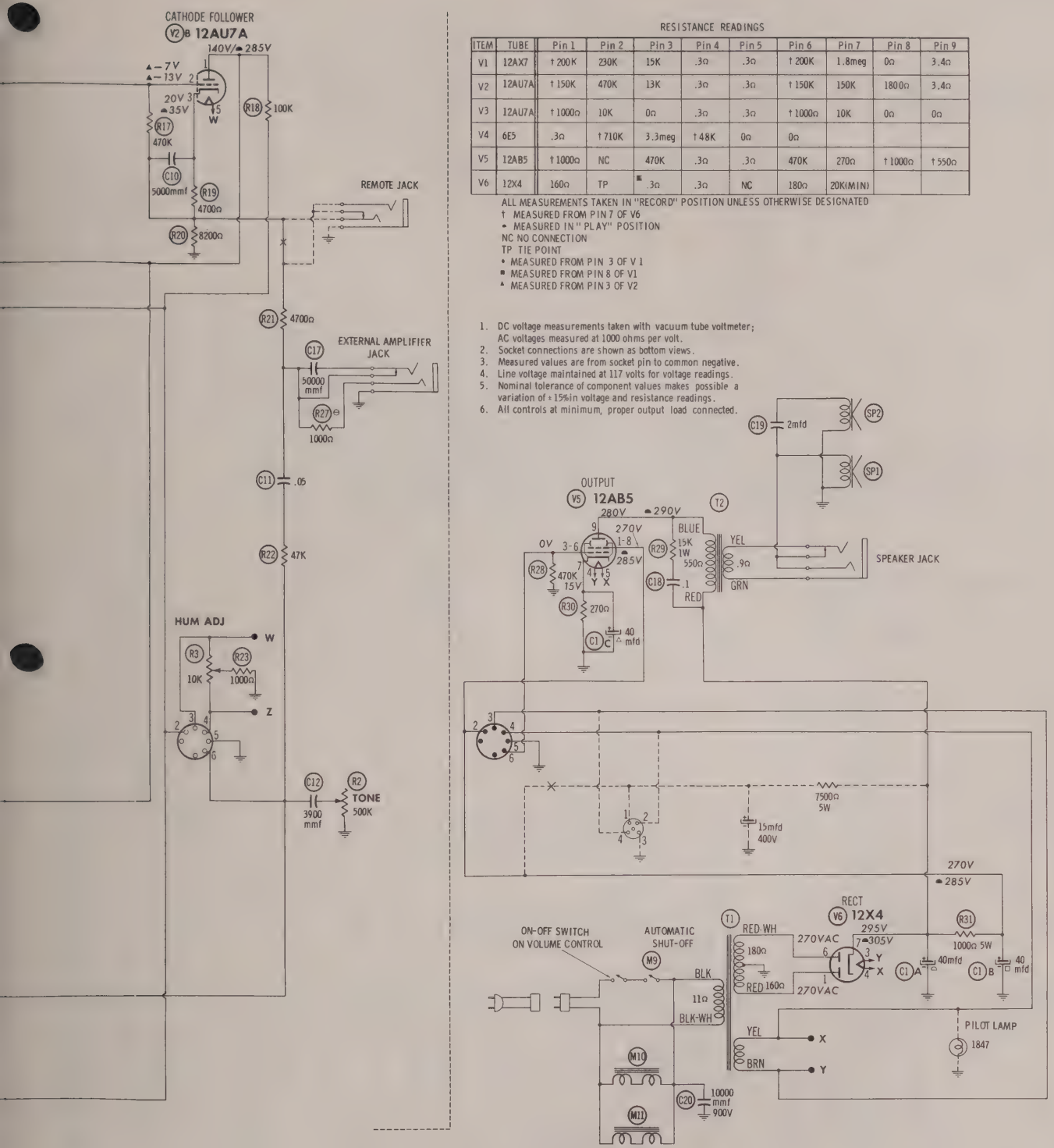

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†200K	230K	15K	.3Ω	.3Ω	†200K	1.8meg	0Ω	3.4Ω
V2	12AU7A	†150K	470K	13K	.3Ω	.3Ω	†150K	150K	1800Ω	3.4Ω
V3	12AU7A	†1000Ω	10K	0Ω	.3Ω	.3Ω	†1000Ω	10K	0Ω	0Ω
V4	6E5	.3Ω	†710K	3.3meg	†48K	0Ω	0Ω			
V5	12AB5	†1000Ω	NC	470K	.3Ω	.3Ω	470K	270Ω	†1000Ω	†550Ω
V6	12X4	160Ω	TP	.3Ω	.3Ω	NC	180Ω	20K(MIN)		

ALL MEASUREMENTS TAKEN IN "RECORD" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 7 OF V6
• MEASURED IN "PLAY" POSITION
NC NO CONNECTION
TP TIE POINT
• MEASURED FROM PIN 3 OF V1
■ MEASURED FROM PIN 8 OF V1
▲ MEASURED FROM PIN 3 OF V2

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Preamplifier	12AX7	Note 1
V2	AF Amp. -Cath. Follower	12AU7A	
V3	Bias Oscillator	12AU7A	

ITEM No.	USE	TYPE	NOTES
V4	Record Level Indicator	6E5	
V5	Output	12AB5	
V6	Rectifier	12X4	

Note. 1. Alternate Type 12AD7

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	WEBCOR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	400	30P292	AFH3-134	C1080	FP369.1	TMT-134	T-685	TVL-3744.2
B	■40	350							
C	▲40	25							
C2	15	300	30P281	PRS350V16	BR1635	TC64	TD-16-350	MT-3516	TVA-1607
C3	10	25	30P290	PRS25V10	BBR10-25	TC22	TD-10-25	MT-0210	TVA-1204

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	WEBCOR PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	.25	50	30P293	P288N-25		CUB2P25	GEM-2025	2TM-P25	
C5	.02	400	30P335	P488N-02		BC6S22J	ACE612	4SE-S22	
C6	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	
C7	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	
C8	2.2		30P333	NP0-SI2.2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C9	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	
C10	5000		30P324	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C11	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	
C12	3900		30P336		DD-392			5GA-D39	
C13	2000		30P286	BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C14	470		30P298	BPD-00047	DD-471	BYA10D47	UC-5347	5GA-T47	
C15	470		30P298	BPD-00047	DD-471	BYA10D47	UC-5347	5GA-T47	
C16	.1	50	30P289	P288N-1		BC2P1J	ACE601	2SE-P10	
C17	50000		30P341	BPD-05	DF-503			5HK-S5	
C18	.1	400	30P309	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C19	2.0	25	30P317-1						
C20	10000	900	30P220	DAC-27	DD16-103	HVE16S1		BL-S10	
C21	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	
C22	200		30P267	BPD-0002	DD-201	L10T2	UC-532	5GA-T2	
C23	39		30P316	N750-DI39	DTN-39	C10Q39U			N750 10%
C24	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	
C25	.05	400	30P283	P488N-05		BC6S47J	ACE615	4SE-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	WEBCOR PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	250K	½	31P126					Volume Note. 1
B	Switch							Power On-Off
R2A	500K	½	31P127					Tone
B	Switch							Monitor On-Off
R3	10K	½	31P123					Hum Balance
R4	2meg	½	31P122					Eye Adjustment

Note 1. Part #31P134-1 used in Model 2821

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		WEBCOR PART No.	NOTES
	OHMS	WATT		
R5	1meg		29M1052	
R6	150K		29M1542	
R7	6800Ω		29M6822	
R8	82K		29M8232	
R9	220K		29M2242	
R10	150K		29M1542	
R11	2700Ω		29M2722	
R12	12K		29M1232	
R13	150K		29M1542	
R14	150K		29M1542	
R15	1800Ω		29M1822	
R16	47K		29M4732	
R17	470K		29M4742	
R18	100K		29M1042	
R19	4700Ω		29M4722	
R20	8200Ω		29M8222	

ITEM No.	RATING		WEBCOR PART No.	NOTES
	OHMS	WATT		
R21	4700Ω		29M4722	
R22	47K		29M4732	
R23	1000Ω		29M1022	
R24	10K		29M1032	
R25	10K		29M1032	
R26	270Ω	2	29M2714	
R27	1000Ω		29M1022	Note 1.
R28	470K		29M4742	
R29	15K	1	29M1533	
R30	270Ω	2	29M2714	
R31	1000Ω	5(WW)	29P072	
R32	470K		29M4742	
R33	3.3meg		29M3352	
R34	560K		29M5642	
R35	47K		29M4732	

Note 1. Some versions may use 4700Ω in this application (Part # 29M4722)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		WEBCOR PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Bias Osc.	65P125				

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	WEBCOR PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @.45A	520VCT @.070A	12.6V @ 1.1A	68P055						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	WEBCOR PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7600Ω	6-8Ω	67P061-1	Z1007	A-2904	AU-604	A-3849	26S46	S-53X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	WEBCOR PART No.	QUAM PART No.	
SP1	5" x 7"	PM	6-8Ω	76P067	57A1Z8.6	Phase
SP2	4"	PM	22Ω	76P050	4A1Z22	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	WEBCOR PART No.	REPLACEMENT DATA
K1	High Frequency Filter		62P015	
K2	Equalization		62P012	

PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	WEBCOR PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1		65P124-2	1215①	1T1 ①		①Two used

MISCELLANEOUS

ITEM No.	PART NAME	WEBCOR PART No.	NOTES
M2	Erase Head Ass'y	11X1765	Left Hand
M3	Erase Head Ass'y	11X1765	Right Hand
M4	Record-Playback Head Ass'y	11X1690	Left Hand
M5	Record-Playback Head Ass'y	11X1690	Right Hand, Model 2811, 2891
	Record Playback Head Ass'y	65P139	Right Hand, Model 2821
M6	Switch	32X117	Record-Playback, Slide Type
M7	Switch	32P120	Head, Rotary Type
M8	Switch	32P091	Equalizing
M9	Switch	32P119	Automatic Shut Off
	Lamp	53P030	#1847, Model 2891
	Printed Board	62P014	
M10	Motor	15X240	4 Pole, Left Hand
M11	Motor	15X239	4 Pole, Right Hand

CABINETS & CABINET PARTS

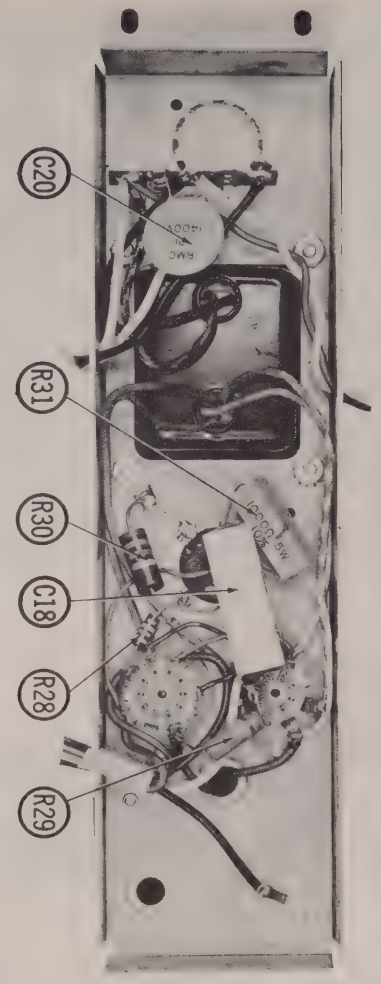
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

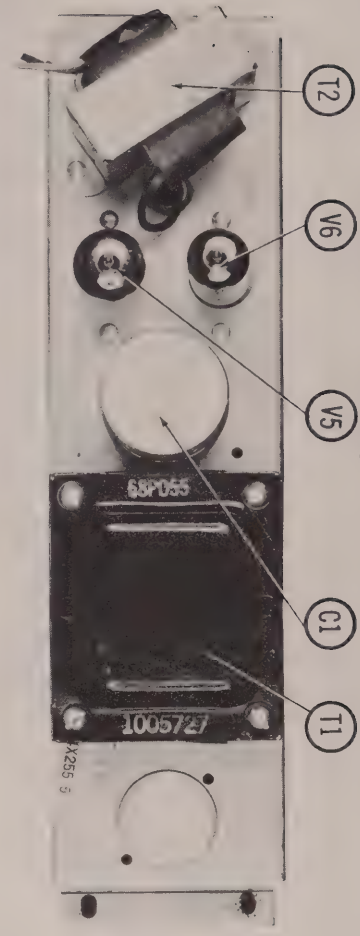
NAME	PART NO.	DESCRIPTION
Knob	39P193-1	Stereo Volume, Model 2821
Knob	49P292-2	Control (Model Numbers with EP)
Knob	49P292-3	Control (Model Numbers with WP)
Knob	11X1790-AF	Shift, Ass'y. (Model Numbers with EP)
Knob	11X1790-AL	Shift, Ass'y (Model Numbers with WP)
Knob	39P175-2	"R" (Record) Push Type (Model Numbers with EP)
Knob	39P175-3	"R" (Record) Push Type (Model Numbers with WP)
Case	92X070-1	Models EP2811, EP2891
Case	92X070-2	Models WP2811, WP2891
Case	92X070-3	Model EP2821
Case	92X070-4	Model WP2821

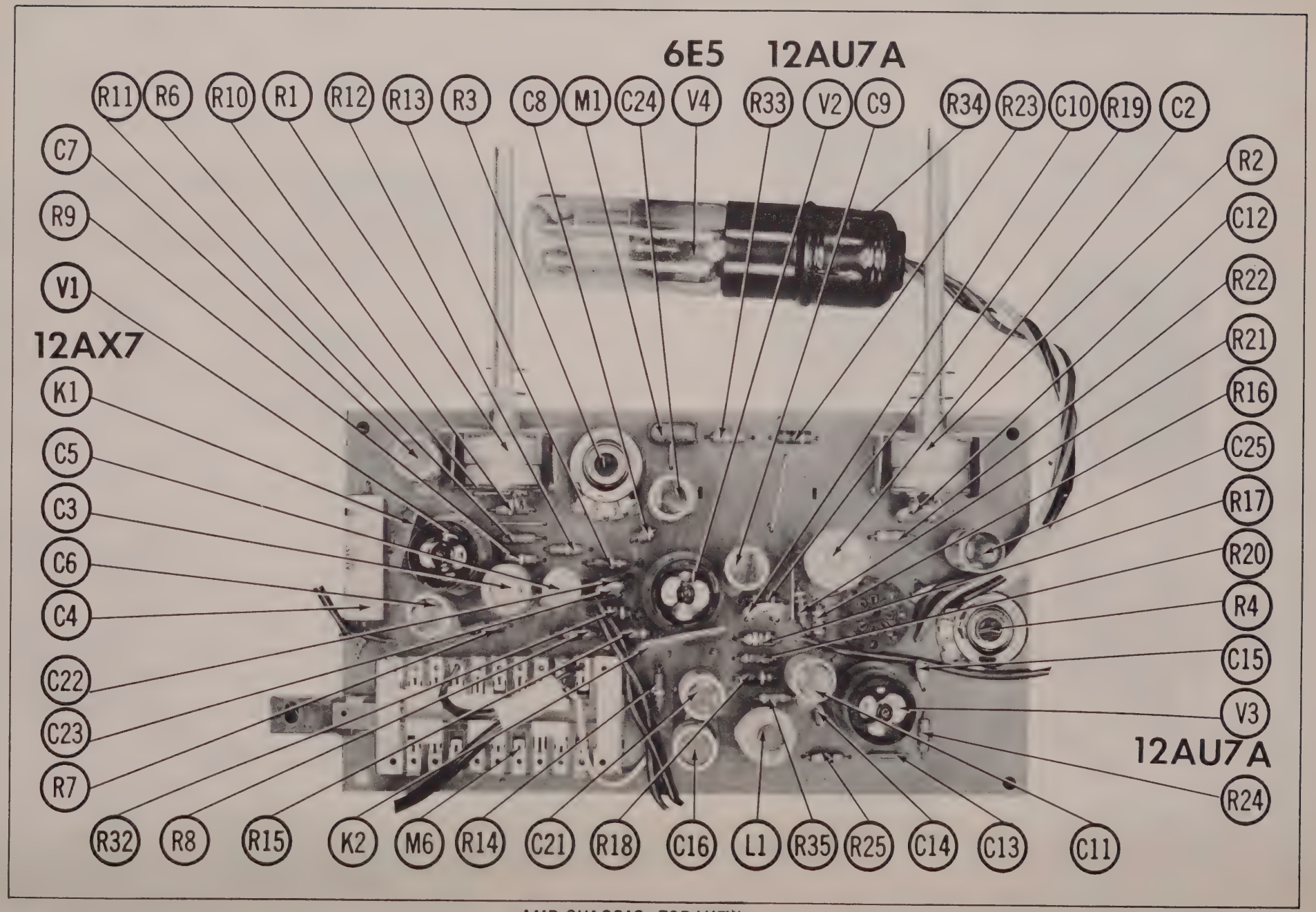
WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No.	1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No.	8401
Phono Pick-up Arm Cable	Use BELDEN No.	8430 (Two Conductor - Twisted)

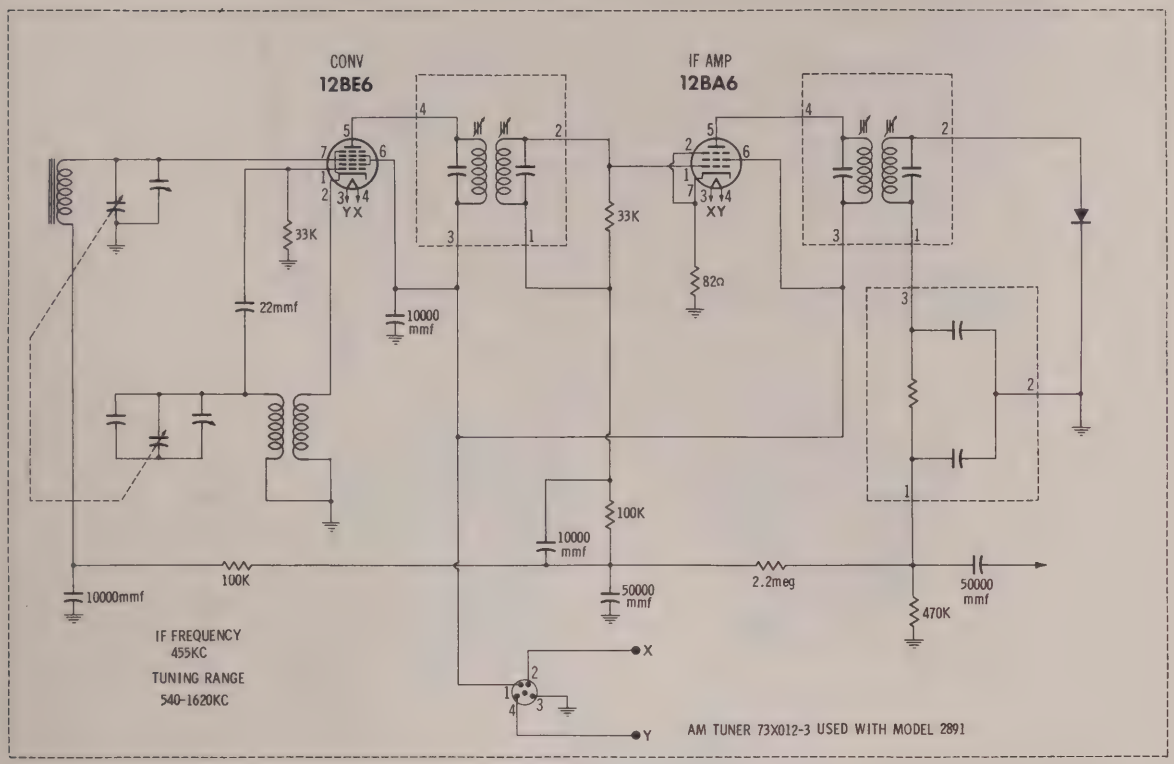
POWER CHASSIS

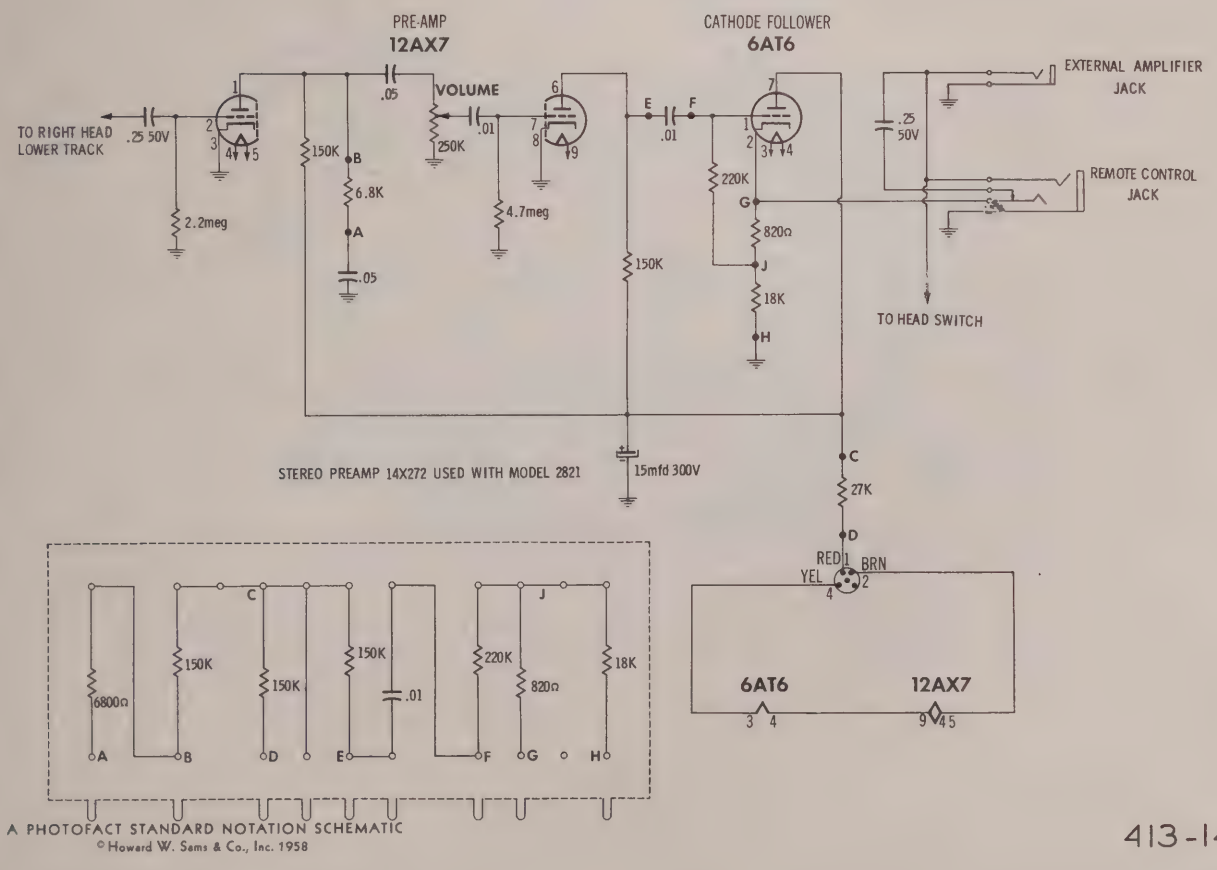






AMP CHASSIS - TOP VIEW





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TUNER & STEREO SCHEMATIC

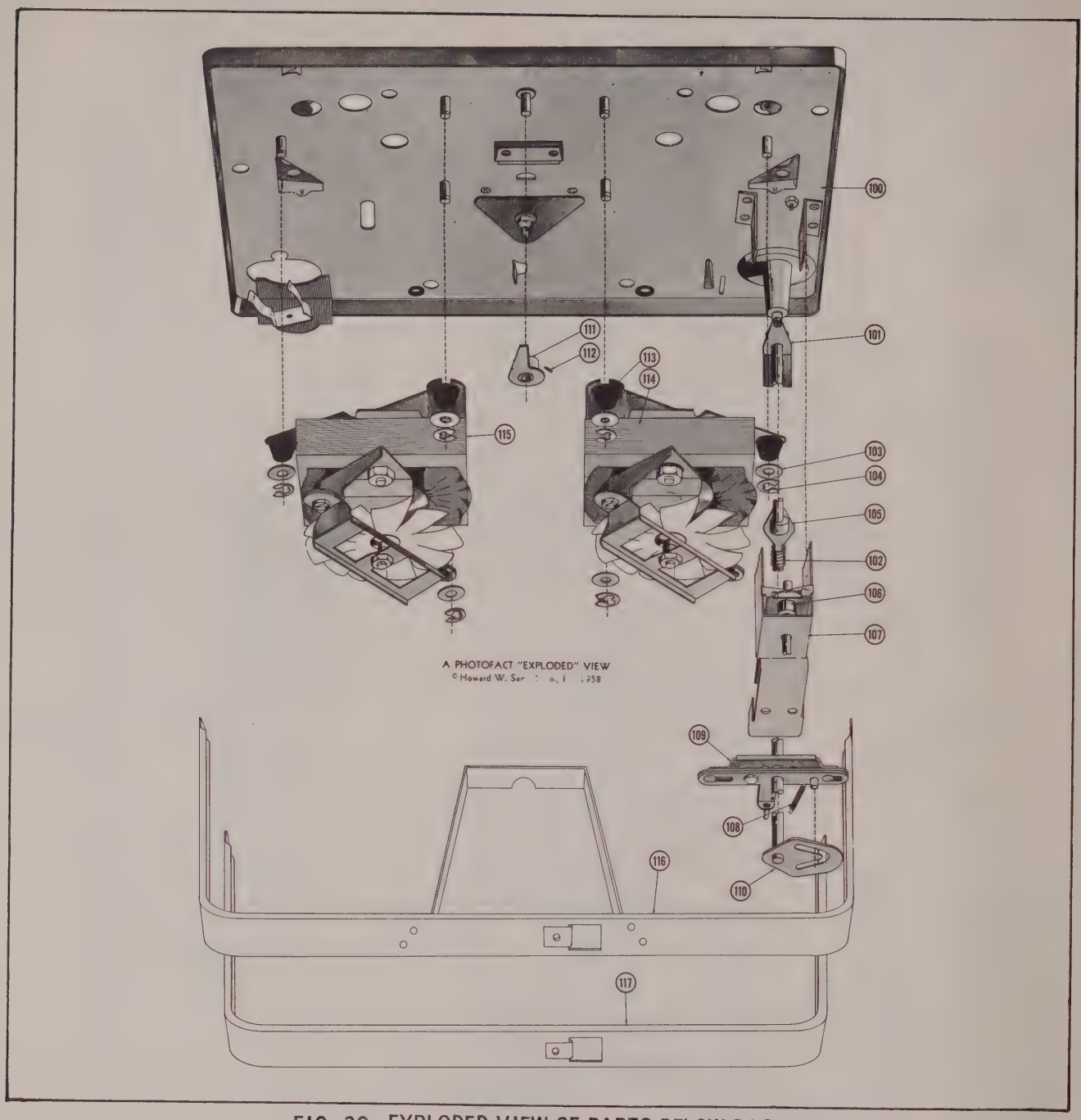


FIG. 3C EXPLODED VIEW OF PARTS BELOW BASEPLATE

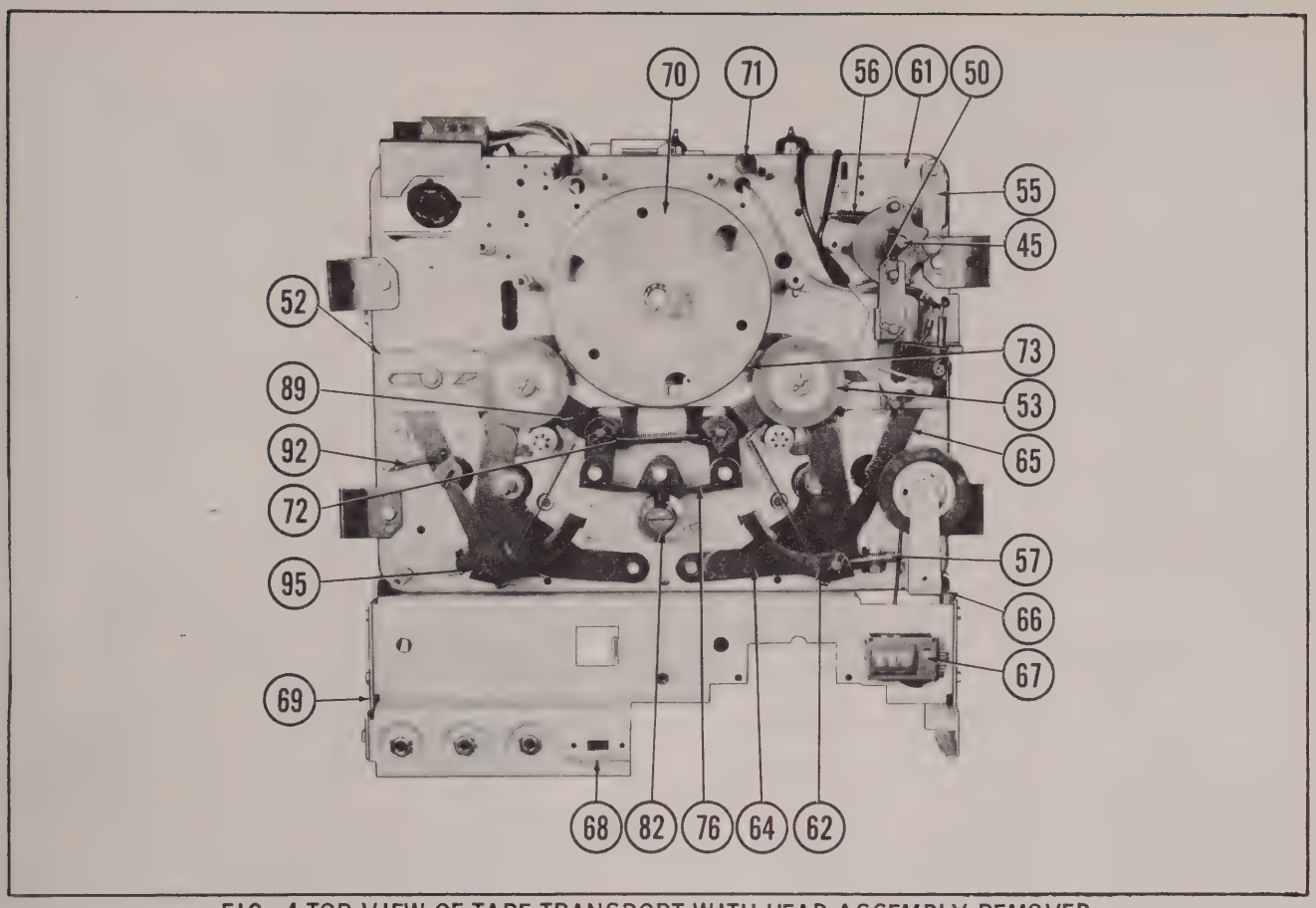


FIG. 4 TOP VIEW OF TAPE TRANSPORT WITH HEAD ASSEMBLY REMOVED

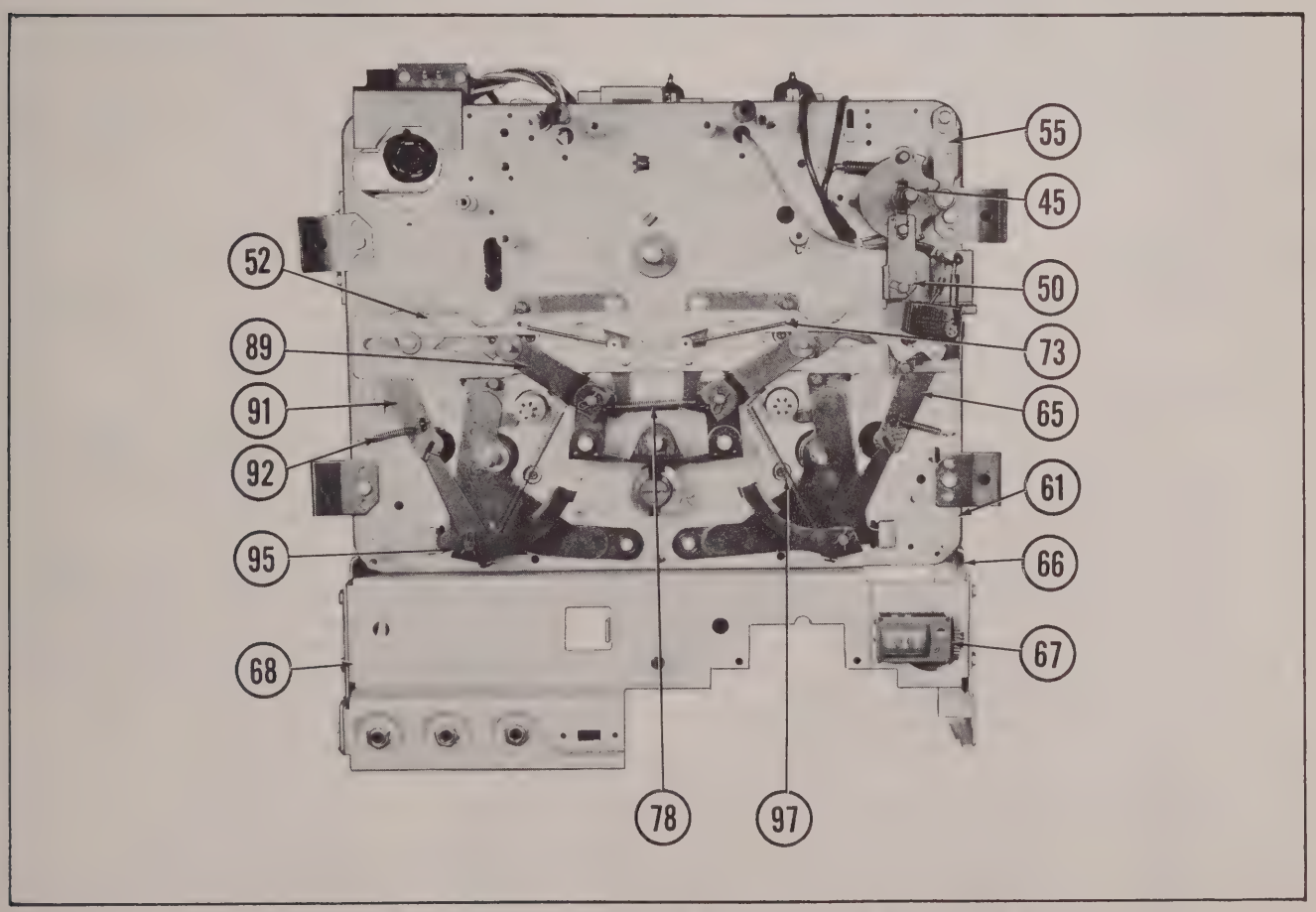


FIG. 5 TOP VIEW WITH HEAD ASSEMBLY AND CAPSTAN ASSEMBLY REMOVED

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	39P175-2	Push Button "Record" Knob, Models EP2811, EP2821, EP2891
	39P175-3	Push Button "Record" Knob, Models WP2811, WP2821, WP2891
2	11X1790-AF	Shift Wing Knob Ass'y., Models EP2811, EP2821, EP2891
	11X1790-AL	Shift Wing Knob Ass'y., Models WP2811, WP2821, WP2891
3	49P292-2	Control Knob, Models EP2811, EP2821, EP2891
	49P292-3	Control Knob, Models WP2811, WP2821, WP2891
4	11X1934-1	Rear Escutcheon "Webcor", Models EP2811, EP2821, EP2891
	11X1934-2	Rear Escutcheon "Webcor", Models WP2811, WP2821, WP2891
5	26P1370-2	Rear Escutcheon Mounting Screws
6	26P1500-3	Rear Escutcheon Mounting Screws
6A	49P305	Spacer
7	26P1446-2	Head Cover Mounting Screws
8	49P302-1AF	Head Cover, "High Fidelity", Model EP2891
	49P302-1AL	Head Cover, "High Fidelity", Model WP2891
	49P302-2AF	Head Cover, "Stereofonic", Model EP2821
	49P302-2AL	Head Cover, "Stereofonic", Model WP2821
	49P302-4AF	Head Cover, "Royal", Model EP2811
	49P302-4AL	Head Cover, "Royal", Model WP2811
9	41P1492	Shoulder Screw
10	26P826	Top Escutcheon Plate Mounting Screws
11	11X1792-3	Top Plate and Escutcheon Ass'y., Models EP2811, EP2821
	11X1792-4	Top Plate and Escutcheon Ass'y., Models WP2811, WP2821
	11X1792-5	Top Plate and Escutcheon Ass'y., Model EP2891
	11X1792-6	Top Plate and Escutcheon Ass'y., Model WP2891
12	49P294-2AF	Front Escutcheon, Models EP2811, EP2821
	49P294-2AL	Front Escutcheon, Models WP2811, WP2821
	49P295-2AL	Front Escutcheon with Radio Off-On, Model WP2891
	49P295-3AF	Front Escutcheon with Radio Off-On, Model EP2891
13	26P1451	Set Screw
14	11X687	Cam and Hub Ass'y.
15	50P224	Spring Clip
16	25P371	Washer
17	11X673	Pressure Roller Ass'y.
18	25P370	Washer
19	11X686	Pressure Roller Arm Ass'y.

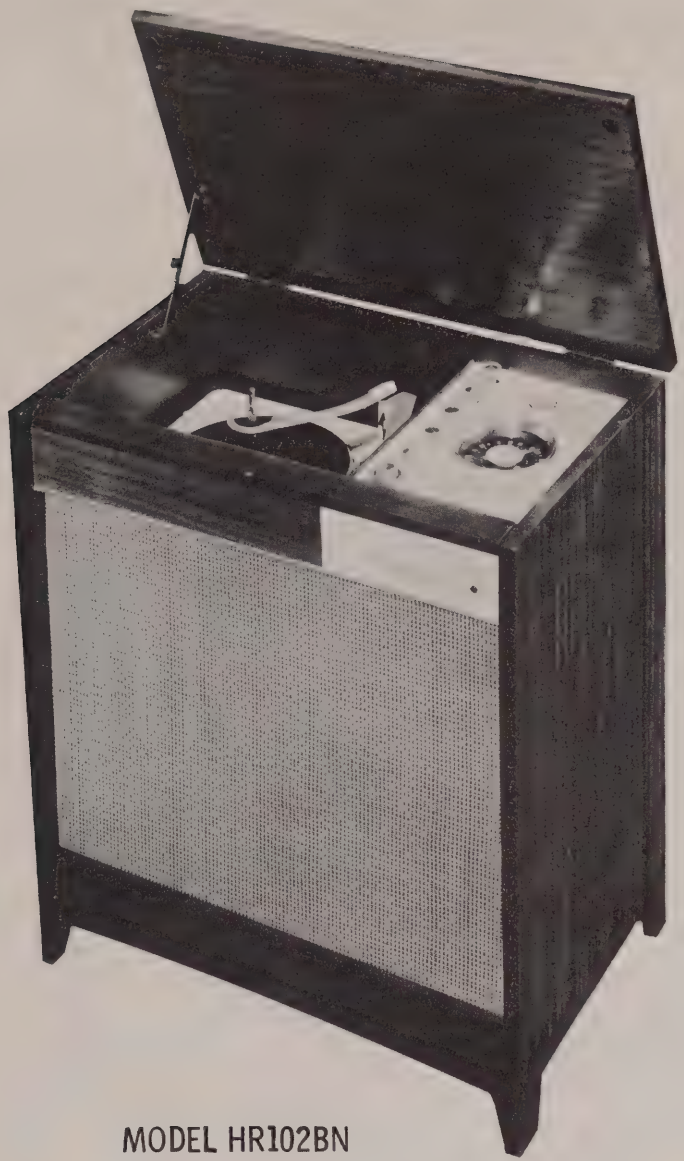
Ref. No.	Part No.	Description
20	46P187	Tension Spring
20A	46P017	Tension Spring
21	50P224	Spring Clip
22	25P010	Washer
23	46P145	Tension Spring
24	11X1777	Erase Arm and Pad Ass'y., (Right)
24A	23P027	Felt Pad, Erase
25	46P479	Tension Spring
26	11X1776	Pressure Arm and Guide Ass'y., (Right)
27	11X1775	Pressure Arm and Erase Pad Ass'y., Complete (Right)
28	46P479	Tension Spring
29	11X1780	Erase Arm and Pad Ass'y., (Left).
29A	23P027	Felt Pad, Erase
30	11X1779	Pressure Arm and Guide Ass'y., (Left)
31	11X1778	Pressure Arm and Erase Pad Ass'y., Complete (Left)
32	45P2303	Hum Control Bracket (Left)
32A	45P2304	Hum Control Bracket (Right)
33	11X1765	Erase Head Ass'y., (Right)
34	11X1765	Erase Head Ass'y., (Left)
35	11X1690	Record-Playback Head Ass'y., (Left)
36	11X1690	Record-Playback Head Ass'y., (Right) Model 2811, 2891
	65P139	Record-Playback Head Ass'y., (Right) Model 2821
37	46P478	Tension Spring
38		Head Bridge & Stud Ass'y.
39	45P2300	Tape Guide
40		Spring
41		Control Link, Part of Item 38
45	41P1631	Control Shaft
46	11X890	Control Index & Stud Ass'y.
47	46P289	Compression Spring
48	41P1103	Collar
49	45P2236	Actuating Lever for Sliding Cam
50	50P224	Spring Clip
51	45P2301	Switch Arm
52	11X1668	Cam Plate Ass'y.
53	11X647	Idler Arm Ass'y., (Right)
54	11X1785	Idler Arm & Wheel Ass'y.
55	11X672	Roller Arm Ass'y.
56	46P488	Tension Spring
57	46P248	Tension Spring
58	72P006	Rubber Belt, Tape Counter
59	11X1770-AV	Clutch & Brake Drum Ass'y., Models EP2811, EP2821, EP2891
	11X1770-GF	Clutch & Brake Drum Ass'y., Models WP2811, WP2821, WP2891
60	11X1664	Bracket & Stud Ass'y.
61		Base Plate
62	11X653	Right Brake Shoe Ass'y.
63	46P139	Tension Spring
64	11X1516	Right Reel Arm Ass'y.
65	11X657	Right Brake Bell Crank Ass'y.
66	45P2486	Right Side Plate

Ref. No.	Part No.	Description
67	74X006-2	Tape Counter Ass'y., Models EP2811, EP2821, EP2891
	74X006-3	Tape Counter Ass'y., Models WP2811, WP2821, WP2891
68	11X1787	Front Bracket & Switch Ass'y., Model 2891
	11X1786	Front Bracket & Post Ass'y., Models 2811, 2821
69	45P2487	Left Side Plate
70	11X650	Capstan Ass'y.
71	49P305	Spacer
72	46P271	Tension Spring
73	46P235	Tension Spring
74	11X659	Right Crank Arm Ass'y.
75	46P239	Tension Spring
76	11X661	Speed Change Lever Ass'y.
77	11X660	Left Crank Arm Ass'y.
78	46P271	Tension Spring
79	11X655	Bell Crank Ass'y., (Right)
80	11X656	Bell Crank Ass'y., (Left)
81	41P802	Capstan Shaft
82	42X402-1AV	Speed Changer Cam
83	26P248	Reel Arm Mounting Screws
84	50P125	Spring Clip
85	25P046	Washer
86	11X754	Wheel & Tire Ass'y.
87	25P046	Washer
88	50P224	Spring Clip
89	11X647	Left Idler Arm Ass'y.
90	11X1770-AV	Clutch & Brake Drum Ass'y., Models EP2811, 2821, 2891
	11X1770-GF	Clutch & Brake Drum Ass'y., Models WP2811, 2821, 2891
90A	11X1513-AV	Brake Drum & Bearing Ass'y., Models EP2811, 2821, 2891
	11X1513-GF	Brake Drum & Bearing Ass'y., Models WP2811, 2821, 2891
90B	46P360	Clutch Spring
90C	45P1739	Upper Clutch Housing Cover
90D	25P615	Clutch Disc
90E	45P1812	Lower Clutch Housing Cover
90F	11X1771	Clutch Housing & Bearing Ass'y.
90G	25P613	Fibre Washer
90H	25P614	Washer
90J	50P301	Retaining Ring
91	11X658	Left Brake Bell Crank Ass'y.
92	46P248	Tension Spring
93	46P139	Tension Spring
94	11X1515	Left Reel Arm Ass'y.
95	11X654	Left Brake Shoe Ass'y.
96	50P224	Spring Clip
97	46P487	Tension Spring
98	45P1065	Index Bracket
99	26P746	Index Bracket Mounting Screws
100		Base Plate
101	11X677	Guide Crank & Hub Ass'y.
102	46P485	Compression Spring
103	25P473	Washer
104	25P535	Retainer Ring
105	11X671	Index Plate Washer
106	11X1899	Crank Plate Ass'y.
107	11X1760	Head Switch Support Bracket Ass'y.
108	46P365	Tension Spring
109	11X1758	Switch Operating Mechanism Ass'y.
110	11X1685	Push Rod & Cam Ass'y.
111	11X662	Switch Crank Ass'y.
112	26P1450	Set Screw
113	25P551	Grommet
114	15X239	4-Pole Motor, Right Hand
115	15X240	4-Pole Motor, Left Hand
116	11X1920	Mechanism Mounting Rail & Support Bracket Ass'y.
117	45P2433	Mechanism Mounting Rail
118	26P1038	#8-32 x 3/8" H.H. Sems S.T. Screw

PHOTOFACT* Folder

WESTINGHOUSE MODELS HR102BN, HR103BN (Ch. V-2500-2, V-2502-1)

WESTINGHOUSE MODELS HR102BN, HR103BN (Ch. V-2500-2, V-2502-1)



MODEL HR102BN

WESTINGHOUSE MODELS HR102BN, HR103BN (Ch. V-2500-2, V-2502-1)

TRADE NAME	Westinghouse Models HR102BN, HR103BN (Ch. V-2502-1 Tuner, V-2500-2 Amplifier)		
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Metuchen, N. J.		
TYPE SET	AC Operated FM-AM Receiver With 4 Speed Automatic Record Changer		
TUBES	Eleven		
POWER SUPPLY	105-120 Volts AC - 60 Cycles	RATING	.75 Amp. @ 117 Volts AC (76 Watts Less Motor)
TUNING RANGE—BROADCAST	540 - 1600KC	FREQ. MOD.	88 - 108MC

FOR SERVICE INFORMATION ON RECORD CHANGER—SEE SIMILAR V-M1200A—PHOTOFACT SET 353 FOLDER 16 OR RECORD CHANGER MANUAL RC-10

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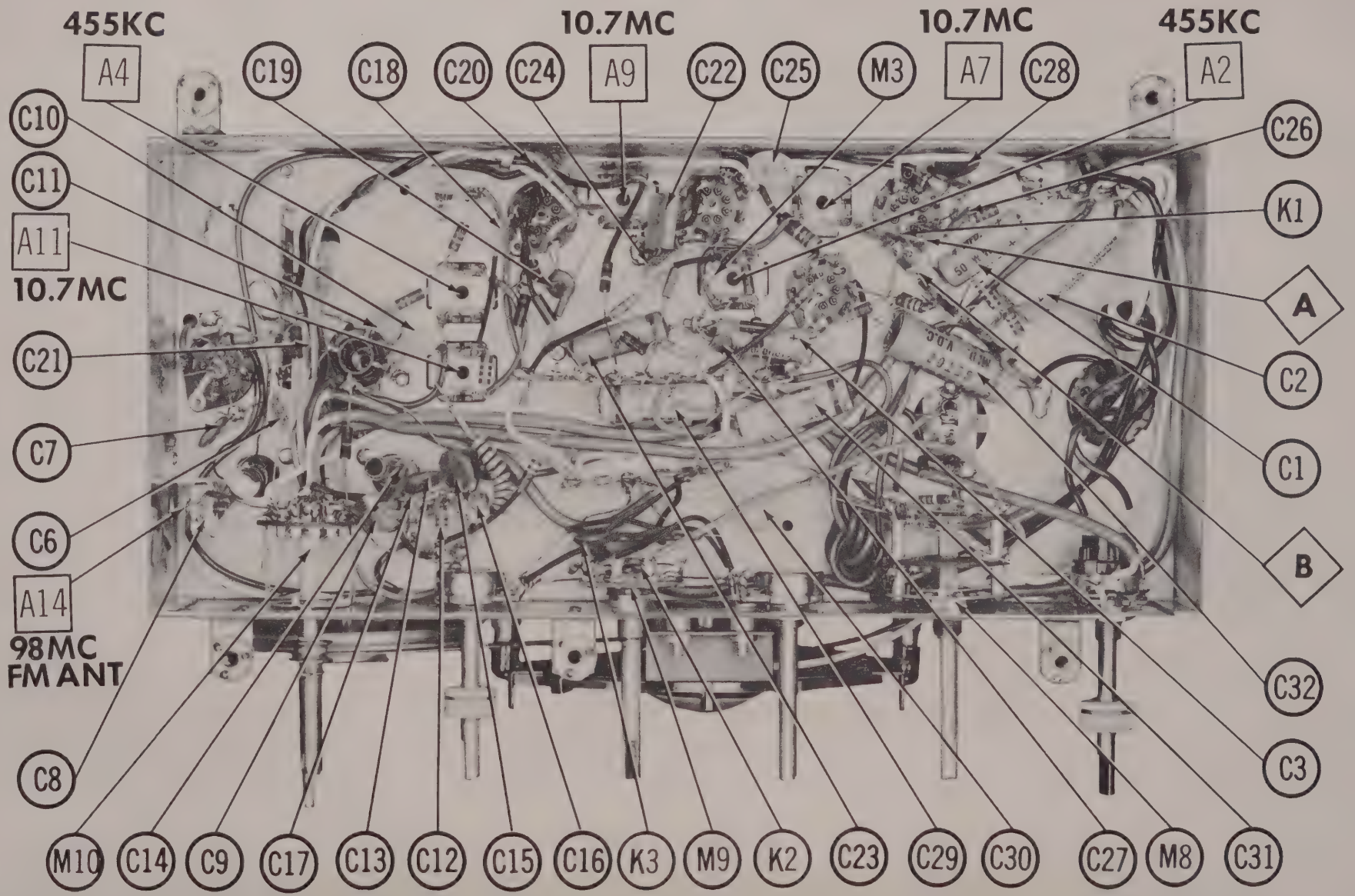
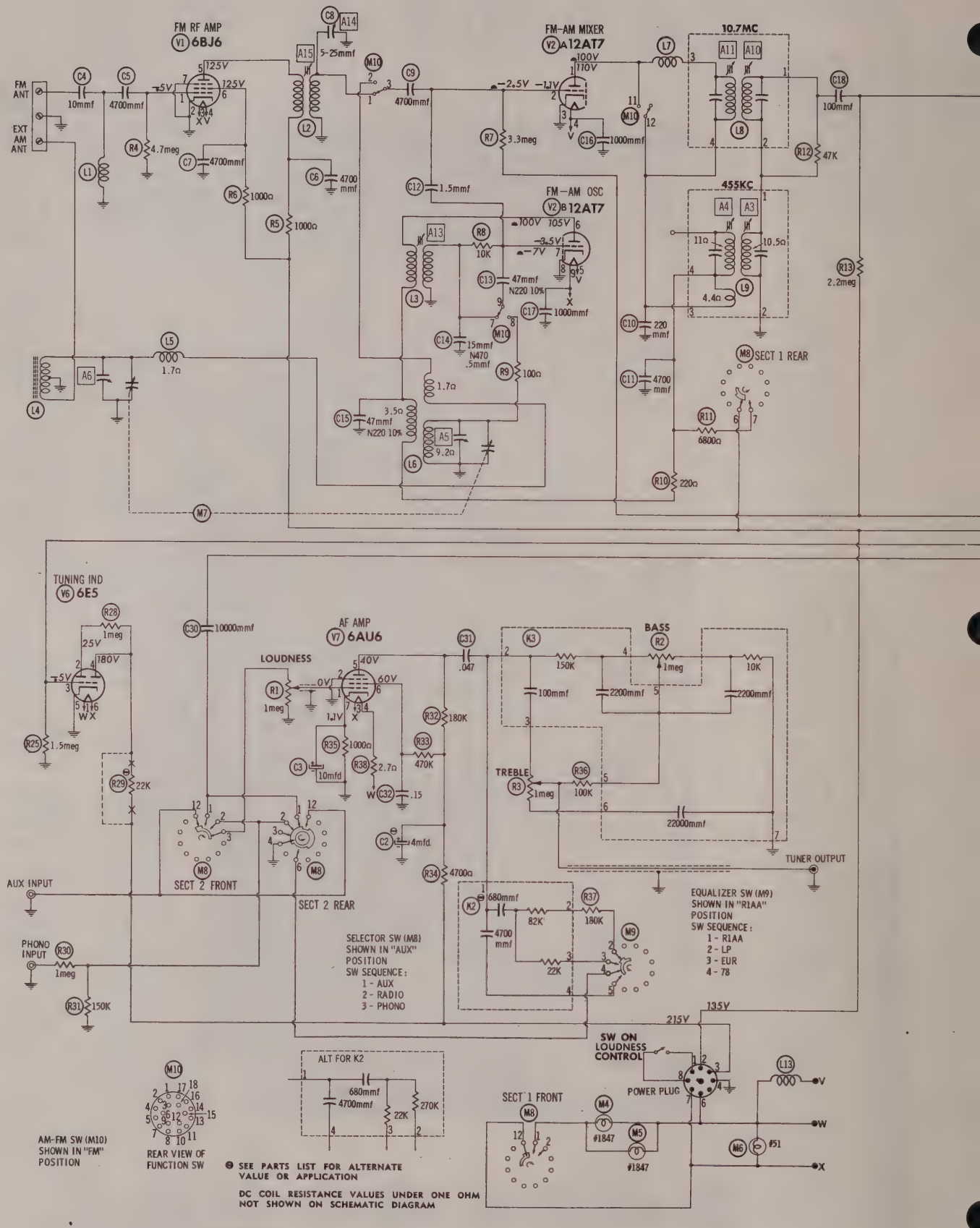


CHASSIS BOTTOM VIEW - CAPACITOR, MISC. & ALIGN. IDENTIFICATION

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



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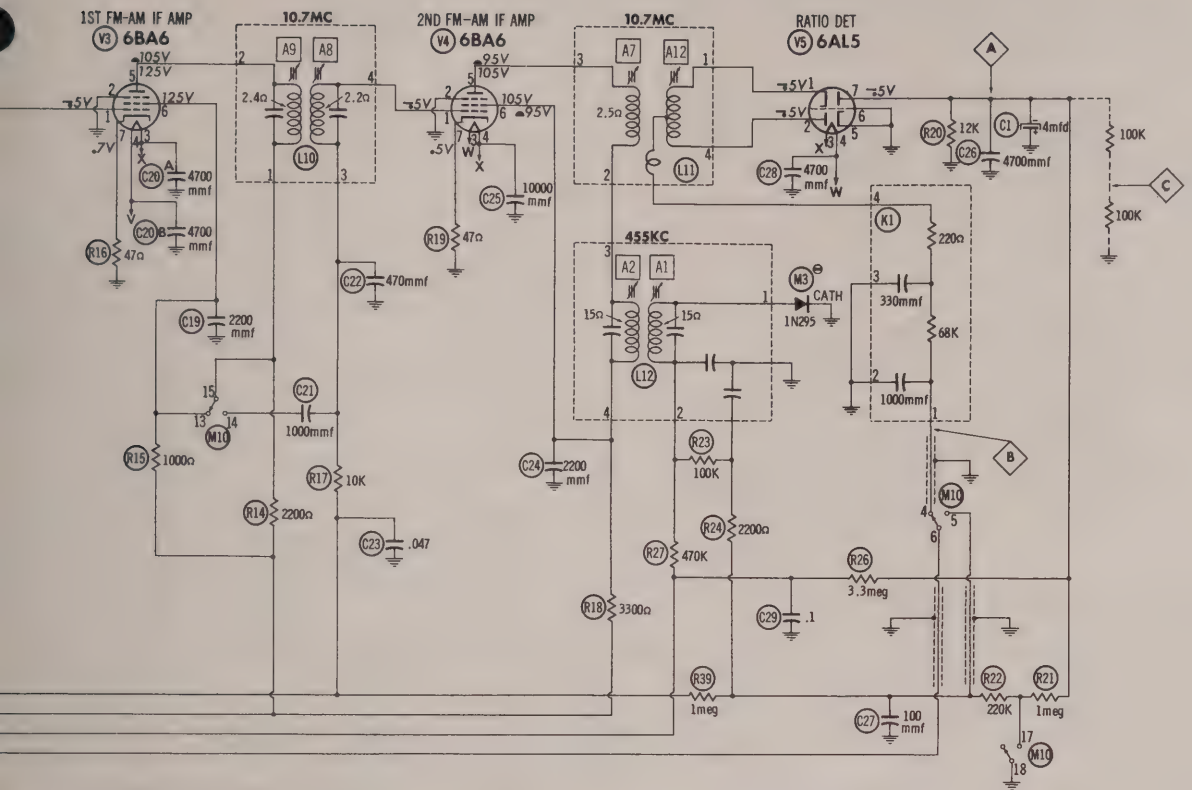

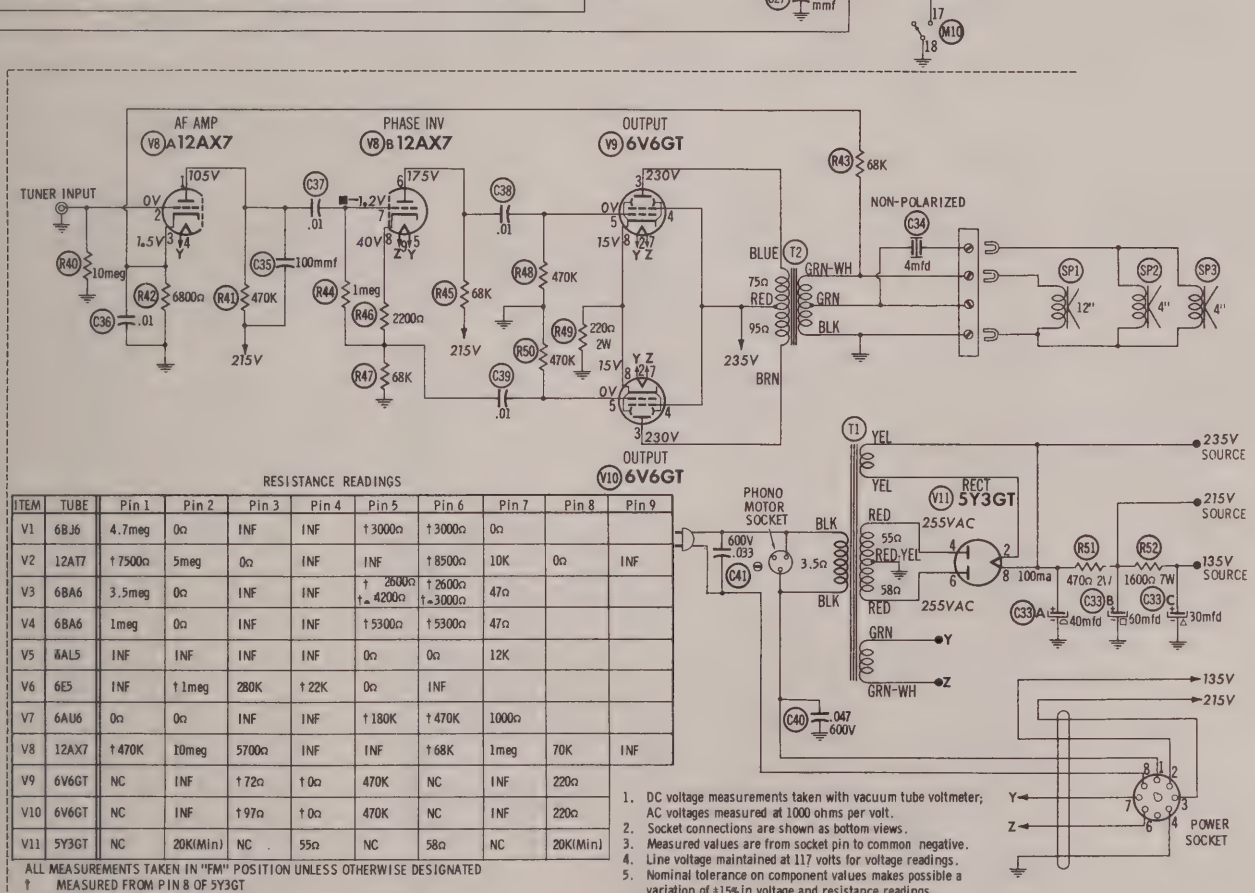

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BJ6	4.7meg	0Ω	INF	INF	†3000Ω	†3000Ω	0Ω		
V2	12AT7	†7500Ω	5meg	0Ω	INF	INF	†8500Ω	10K	0Ω	INF
V3	6BA6	3.5meg	0Ω	INF	INF	† 2600Ω ‡ 4200Ω	† 2600Ω ‡ 3000Ω	47Ω		
V4	6BA6	1meg	0Ω	INF	INF	†5300Ω	†5300Ω	47Ω		
V5	6AL5	INF	INF	INF	INF	0Ω	0Ω	12K		
V6	6E5	INF	†1meg	280K	†22K	0Ω	INF			
V7	6AU6	0Ω	0Ω	INF	INF	†180K	†470K	1000Ω		
V8	12AX7	†470K	10meg	5700Ω	INF	INF	†68K	1meg	70K	INF
V9	6V6GT	NC	INF	†72Ω	†0Ω	470K	NC	INF	220Ω	
V10	6V6GT	NC	INF	†97Ω	†0Ω	470K	NC	INF	220Ω	
V11	5Y3GT	NC	20K(Min)	NC	55Ω	NC	58Ω	NC	20K(Min)	

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 8 OF 5Y3GT
‡ MEASURED IN "AM" POSITION
▪ MEASURED FROM PIN 8 OF V8
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to AM Antenna terminal on tuning gang. Low side to chassis.	455KC (400~ Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1400KC	"	1400KC	"	A5	"
3.		Loop	1600KC	"	1600KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K (±1%) resistors in series from point (A) to chassis. The junction of these two resistors is alignment point (C) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.005mfd	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A7, A8, A9, A10, A11	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to point (C).	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.005mfd	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A7, A8, A9, A10, A11	Disconnect stabilizing capacitor C1. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1
5.	"	"	"	"	"	Vert. Amp. to point (B). Low side to chassis.	A12	Reconnect C1. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	270Ω Carbon Resistor	High side to FM Antenna terminal. Low side to chassis.	98MC (Unmod)	FM	98MC	DC probe to point (A). Common to chassis.	A13	Adjust for maximum deflection.
7.	"	"	"	"	"	"	A14	"
8.	"	"	105MC	"	105MC	"	A15	"
9.	"	"	90MC	"	90MC	"	A14	Adjust for maximum deflection. Repeat steps 8 and 9.

FIG. 1

FIG. 2

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM RF Amplifier	6BJ6	
V2	FM AM Mixer -		
	FM AM Osc.	12AT7	
V3	1st FM AM IF Amplifier	6BA6	

ITEM No.	USE	TYPE	NOTES
V4	2nd FM AM IF Amplifier	6BA6	
V5	Ratio Detector	6AL5	
V6	Tuning Indicator	6E5	
V7	AF Amplifier	6AU6	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	4	50	218V025H11	PRS150V4	BBR4-50	TC30	TD-4-50	MT-0504	TE-1302.1
C2	4	450	V-4885-6-1 ①	PRS450V40	BR445	TC70	TD-4-450	MT-4504	TVA-1702
C3	10	25	218V040H01	PRS25V10	BBR10-25	TC22	TD-10-25	MT-0210	TVA-1204

① Some versions may use 10mfd in this application (Part #218V038H01).

FIXED CAPACITORS

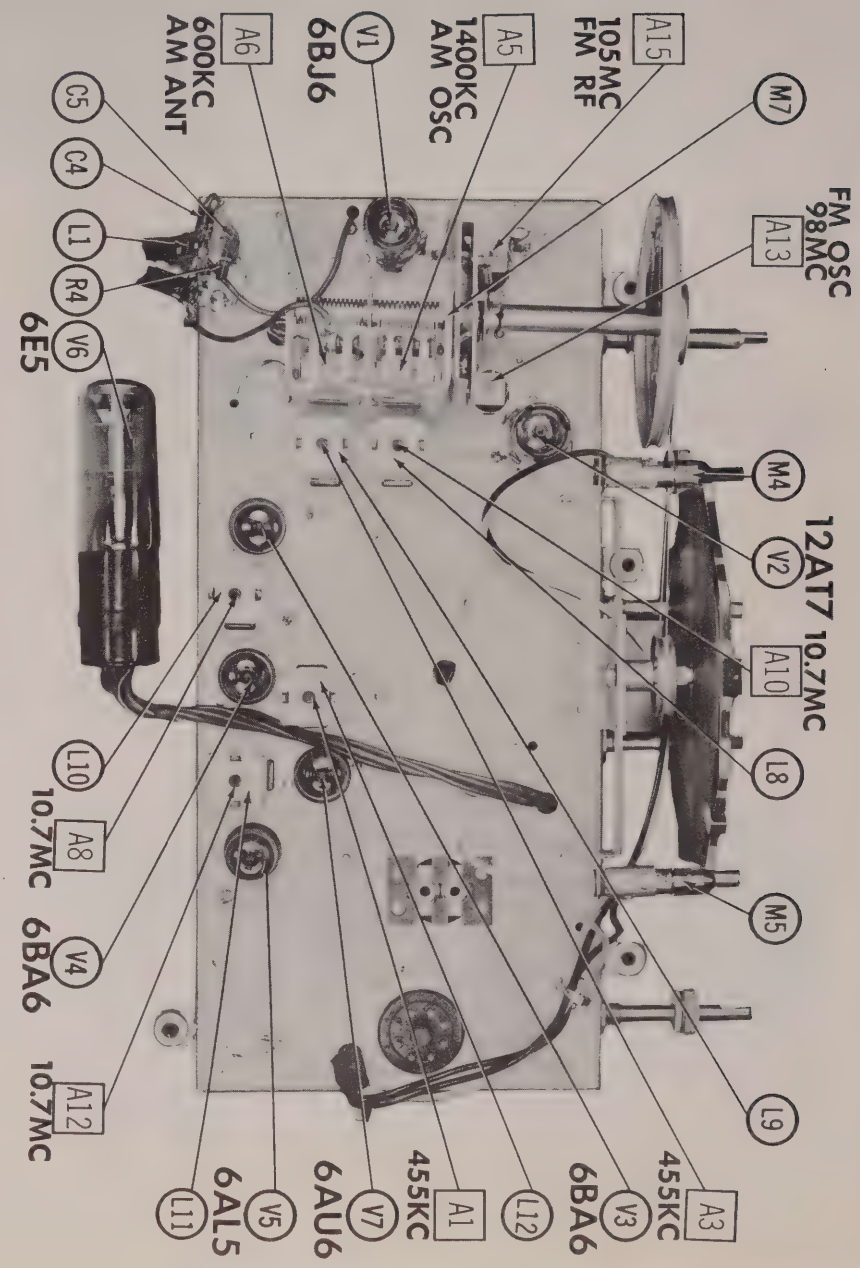
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Westinghouse PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	10		217V021A00	SI 10	D6-100	LT6Q1	UC-541	5GA-Q1	
C5	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C6	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C7	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C8	5-25		217V504H01						
C9	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C10	220		215V022A21	BPD-00022	DD-221	L10T22	UC-5322	5GA-T22	
C11	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C12	1.5		217V021A59	NPO-SI 1.5	TCZ-1R5	CTA6V15C	ZT-5515	5TCCB-V15	
C13	47		215V014A70						N220 10%
C14	15								N470
C15	47		215V014A70						N220 10%
C16	1000		215V111A02	BPD-001	DD-102	L10D1	DC521	5GA-D1	
C17	1000		215V111A02	BPD-001	DD-102	L10D1	DC521	5GA-D1	
C18	100		215V101A01	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C19	2200		215V102A22	BPD-0022	DD-222	L10D22	UC-5222	5HK-D22	
C20A	4700		215V301H02	BPD-2X0047	DD2-502	BYC6DD47	UC-5247	5HK-2D47	
B	4700						UC-5247		
C21	1000		215V101A02	BPD-001	DD-102	L10D1	DC521	5HK-D1	
C22	470		215V104A71	1468-00047	DD-471	5W5T47		1FM-347	
C23	.047	200	210V004A73	P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C24	2200		215V102A22	BPD-0022	DD-222	L10D22	UC-5222	5HK-D22	
C25	10000		215V111A03	BPD-01	DD-103	L10S1	DC511	5HK-S1	
C26	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C27	100		215V101A01	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C28	4700		215V114A72	BPD-0047	DD-472	L10D47	UC-5247	5HK-D47	
C29	.1	200	210V001A04	P288N-1	DF-104	CUB2P1	GEM-401	2TM-P1	
C30	10000		215V111A03	BPD-01	DD-103	L10S1	DC511	5HK-S1	
C31	.047	400	210V014A73	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C32	.15	400	210V011A54	P488N-15		CUB4P15	GEM-4015	4TM-P15	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	½	270V049H01		A47-1meg-Z		PP16A	Loudness
B	Shaft				FS-3			
C	Switch				SWE-12			
R2A	1meg	½	270V048H02	B-69	A47-1meg-S	Q11-137	U54	Bass
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	1meg	½	270V048H01	B-69	A47-1meg-S	Q11-137	U54	Treble
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

TUNER CHASSIS—TOP VIEW



TUNER PARTS LIST AND DESCRIPTIONS (cont)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	NOTES
R4	4.7meg		250V234A75	
R5	1000Ω		250V231A02	
R6	1000Ω		250V231A02	
R7	3.3meg		250V233A35	
R8	10K		250V221A03	
R9	100Ω		250V231A01	
R10	220Ω		250V232A21	
R11	6800Ω		250V236A82	
R12	47K		250V234A73	
R13	2.2meg		250V232A25	
R14	2200Ω		250V232A22	
R15	1000Ω		250V231A02	
R16	47Ω		250V234A70	
R17	10K		250V231A03	
R18	3300Ω		250V223A32	
R19	47Ω		250V234A70	
R20	12K		250V221A23	
R21	1meg		250V231A05	
R22	220K		250V222A24	
R23	100K		250V231A04	
R24	2200Ω		250V232A22	
R25	1.5meg		250V221A55	
R26	3.3meg		250V233A35	
R27	470K		250V234A74	
R28	1meg		250V231A05	
R29	22K		250V232A23	Note 1
R30	1meg		250V231A05	
R31	150K		250V231A54	
R32	180K		250V221A84	
R33	470K		250V234A74	
R34	4700Ω		250V224A72	
R35	1000Ω		250V231A02	
R36	100K		250V231A04	
R37	180K		250V221A84	
R38	2.7Ω		251V002A79	
R39	1meg		250V231A05	

Note 1. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA Westinghouse PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Ant. Coil	230V049H01	19-1000	BC-561	4602		1 Microhenry
L2	FM RF Coil	230V054H01					
L3	FM Osc. Coil	230V055H03					
L4	Loop Stick	310V024H01					
L5	RF Choke	230V028H05	19-1002	BC-563	4606		2.7 Microhenries; IRC Part #CLA
L6	AM Osc. Coil	230V053H02					
L7	RF Choke	230V056H14	19-3001	BC-561	4594	VP-9	.9 Microhenry
L8	1st FM IF	235V039H01	16-3487	FM-254	1463		
L9	1st AM IF	235V036H01					
L10	2nd FM IF	235V037H01	16-3487	FM-254	1463		
L11	Ratio Det.	235V040H01	17-3498	FM-255	1465		
L12	2nd AM IF	235V038H01	16-6770	BC-355	12-C6		
L13	Fil. Choke	230V056H02	19-1000	BC-561	4602		1.1 Microhenry

TUNER PARTS LIST AND DESCRIPTIONS (cont)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Westinghouse PART No.	REPLACEMENT DATA
K1	De-Emphasis	330mmf, 1000mmf, 220Ω, 68K	219V017H01	
K2	Record Compensation	680mmf, 4700mmf, 82K, 22K	219V018H01 ①	
K3	Tone Compensation	100mmf, 2200mmf, 2200mmf, 22000mmf, 10K, 150K	219V021H02	

① Late production versions replace the 82K with 270K (K2 Part #219V018H02).

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA Westinghouse PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. MOUNT	REMARKS
M1		81-TB		56	PT-2	

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA Westinghouse PART No.	JENSEN PART No.	WALCO PART No.	REMARKS
M2		† S-66 or †♦ S-66SD or ♦ S-66D	† W-77TPS or †♦ W-77DS or ♦ W-77TPD	† Jewel ♦ Diamond

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA Westinghouse PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M3	1N295 ①	296V002H01	1N60	1N60	AM Detector, Pigtail Leads ① Alternate Type 1N87G

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M4	Dial Lamp	756V501H02	#1847
M5	Dial Lamp	756V501H02	#1847
M6	Lamp	756V501H05	Indicator, #51
M7	Tuning Cap.	330V017H01	2 Gang (Ant. 28-420mmf, Osc. 12-170mmf)
M8	Switch	756V023H01	Aux-Radio-Phono, 2 Section, Rotary Wafer Type
M9	Switch	756V026H01	Equalizer, One Section Rotary Wafer Type
M10	Switch	756V022H01	AM FM Selector, One Section Rotary Wafer Type

POWER **PARTS LIST AND DESCRIPTIONS**

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V8	AF Amp. - Phase Inv.	12AX7	
V9	Output	6V6GT	
V10	Output	6V6GT	
V11	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C33A	▬40	350	218V030H01	AFH3-154-20	C0232	FP375.4	TMQ-119	T-111	TVL-3640.2
B	■60	300							
C	▲30	250							
C34	4	50NP	218V035H01	NP-PRS50V4	BBR8-150 † BBR8-150 †	TC41 † TC41 †	TD-8-150 † TD-8-150 †	MT-1508 † MT-1508 †	R2415 *

* Non Catalog Item.

† Connect Negative Leads together.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	Westinghouse PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C35	100		215V101A01	BPD-0001	DD-101	L10T1	UC-531	5GA-T1	
C36	.01	400	210V051A03	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C37	.01	400	210V051A03	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C38	.01	400	210V051A03	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C39	.01	400	210V051A03	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C40	.047	600	210V024A73	P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C41	.033	600		P688N-033	DF-303	CUB6S33	GEM-6133	6TM-S33	①

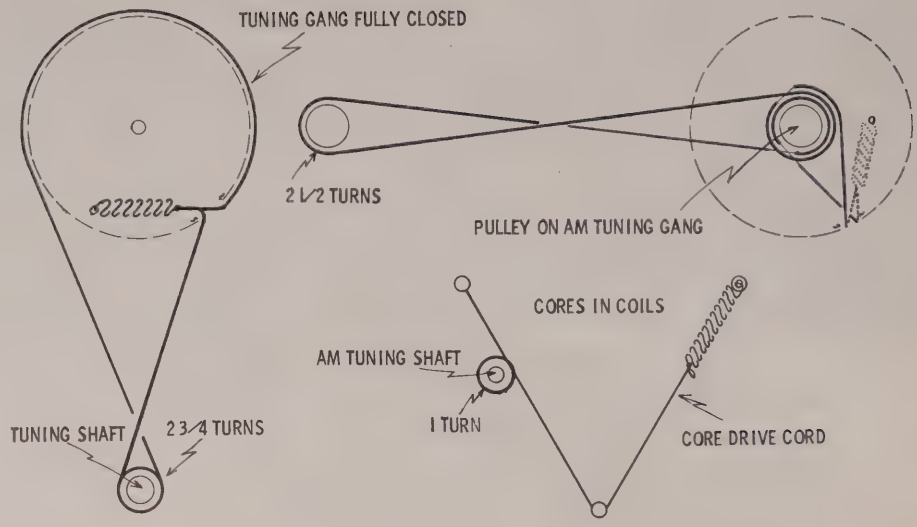
① Some versions use .047 400V (210V024A73) in this application.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	NOTES
R40	10meg		250V231A06	
R41	470K		250V224A74	
R42	6800Ω		250V226A82	
R43	68K		250V226A83	
R44	1meg		250V231A05	
R45	68K		250V226A83	
R46	2200Ω		250V222A22	
R47	68K		250V226A83	
R48	470K		250V234A74	
R49	220Ω	2	250V422A21	
R50	470K		250V234A74	
R51	470Ω	2	250V424A71	
R52	1600Ω	7	251V020H14	

DIAL CORD STRINGING



POWER **PARTS LIST AND DESCRIPTIONS** (Con't)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .75A	500VCT @ .099A	5V @ 1.8A	410V007H01				PC8405①		
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 3.7A									

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7400Ω	12Ω Tap @ 6Ω	430V049H01							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	12"	PM	12Ω	570V032H01	12A6Z12.6	
SP2	4"	PM	12-14Ω	570V035H01	4A1Z14.5	
SP3	4"	PM	12-14Ω	570V035H01	4A1Z14.5	

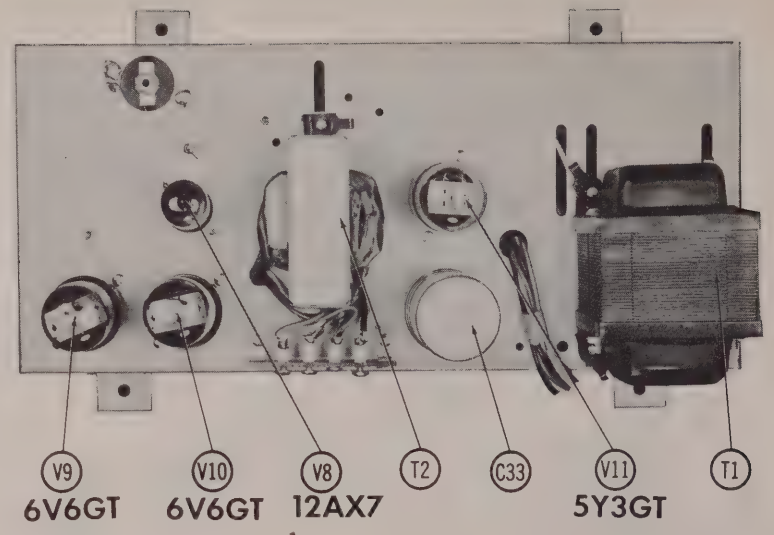
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

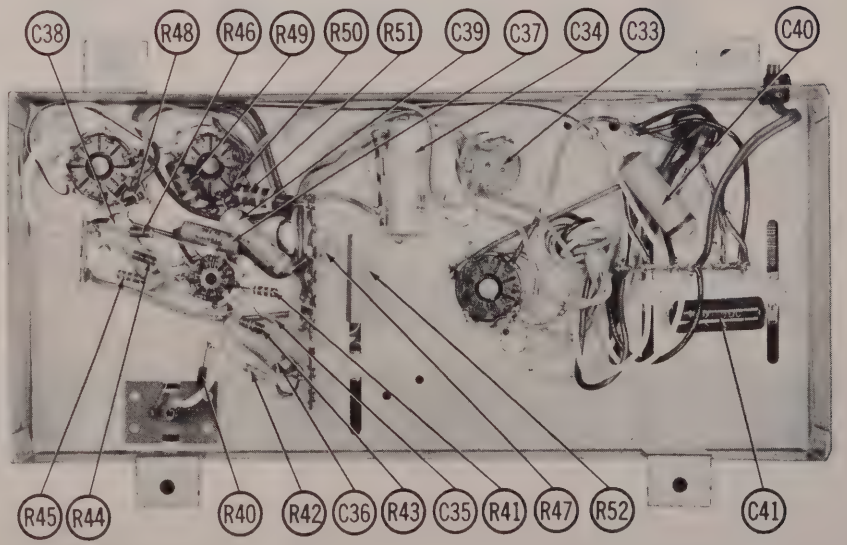
NAME	PART NO.	DESCRIPTION
Knob	550V035H04	Input Selector, Equalization, Treble, Bass, Loudness
Knob	550V035H07	AM FM Selector
Knob	550V071H03	Tuning
Dial Crystal	558V132H01	
Bezel	558V130H01	Tuning Indicator
Bezel	558V141H01	Dial
Cabinet	516V048H01	Mahogany, Model HR102BN
Cabinet	516V048H02	Limed Oak, Model HR103BN

WIRING DATA

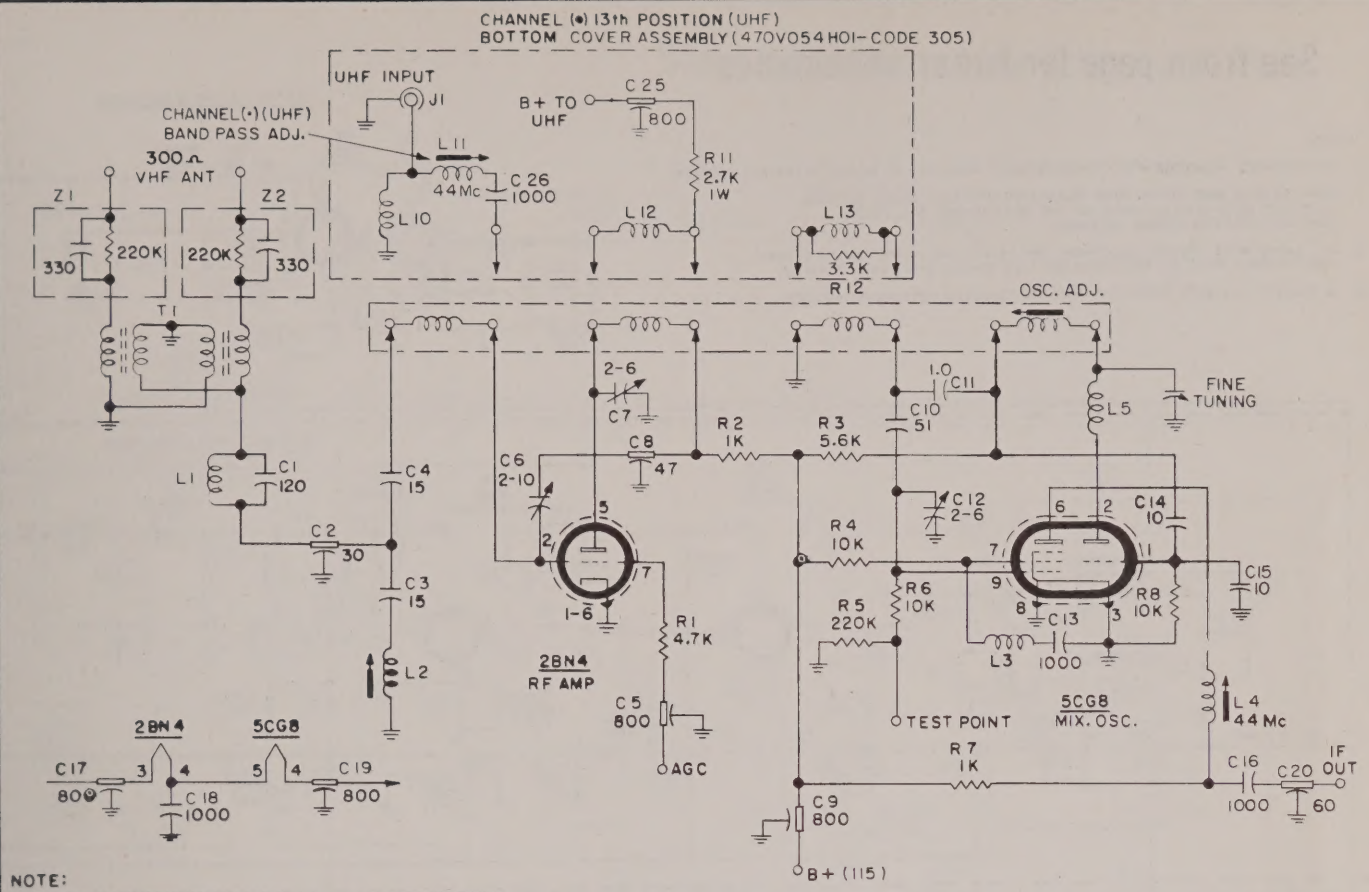
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)



AMP CHASSIS TOP VIEW

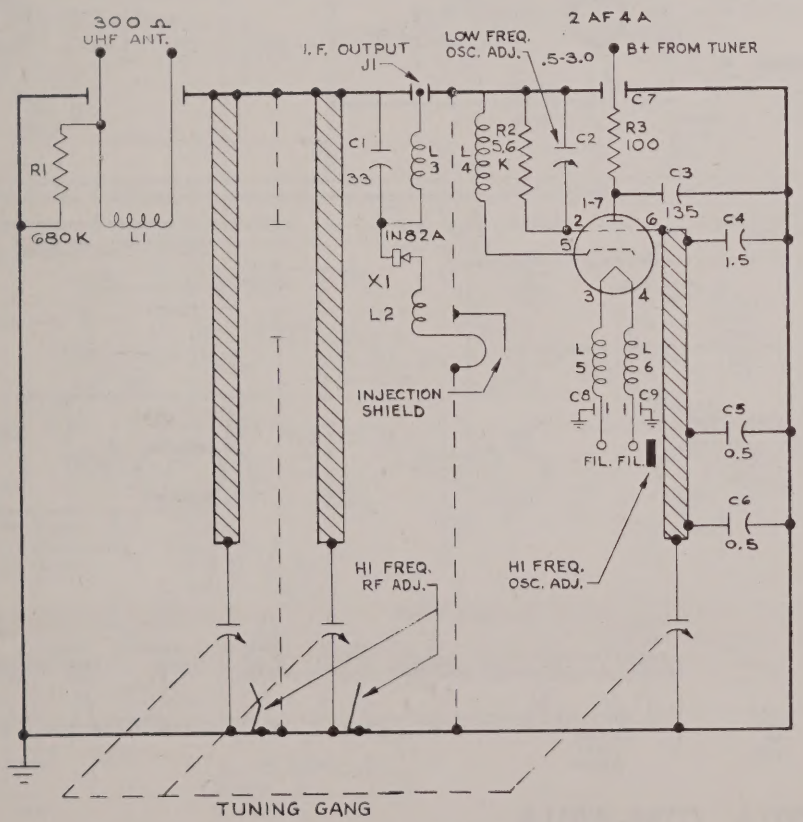


AMP CHASSIS BOTTOM VIEW



NOTE:
1. ALL CAPACITANCE VALUES IN uuf, ALL RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED.

FNS-089 & FNS-090 VHF tuners



General Instrument 204-5 UHF tuner

See next page for main schematic

Schematic Diagrams Courtesy of Montgomery Ward & Co.

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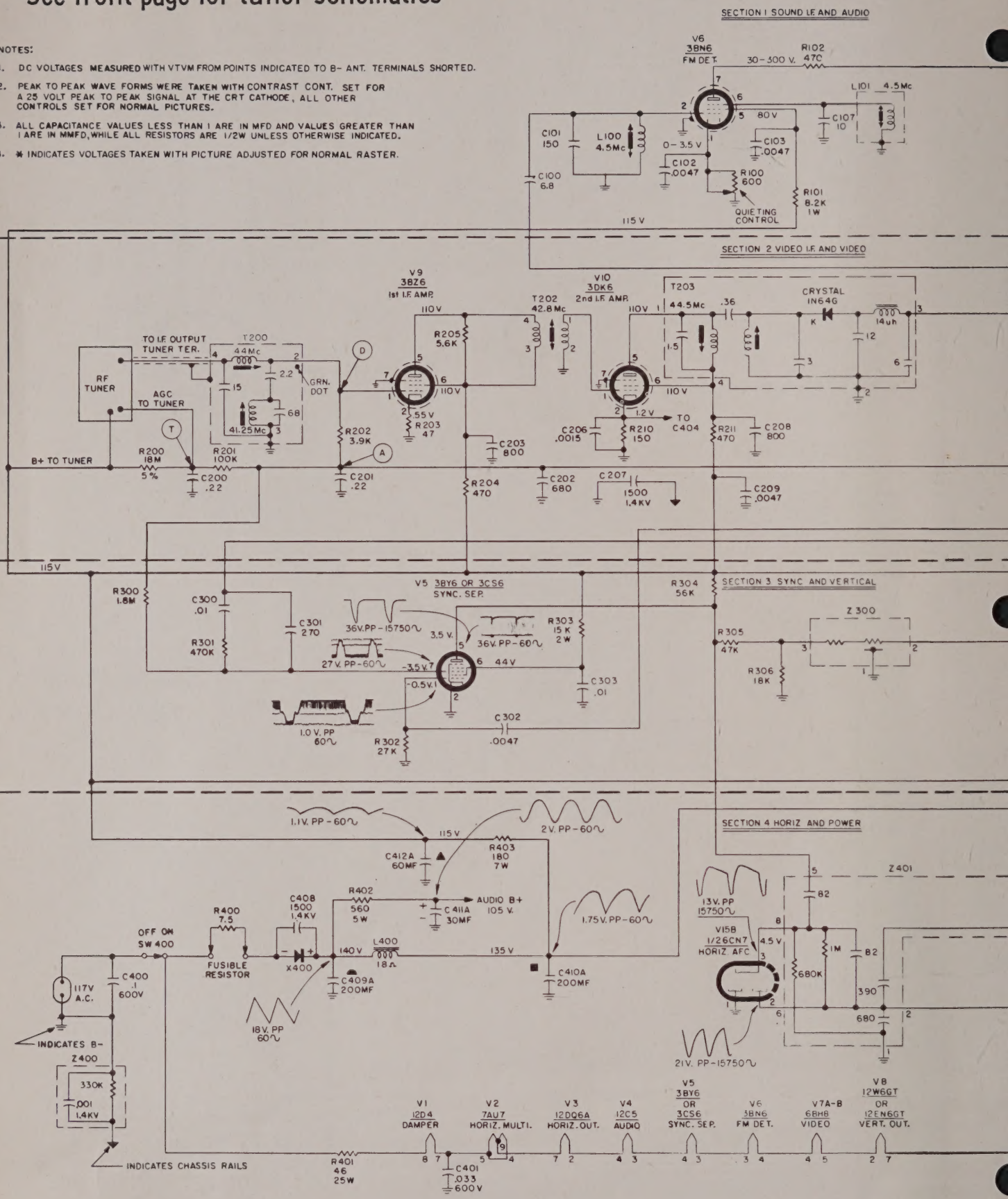
See front page for tuner schematics

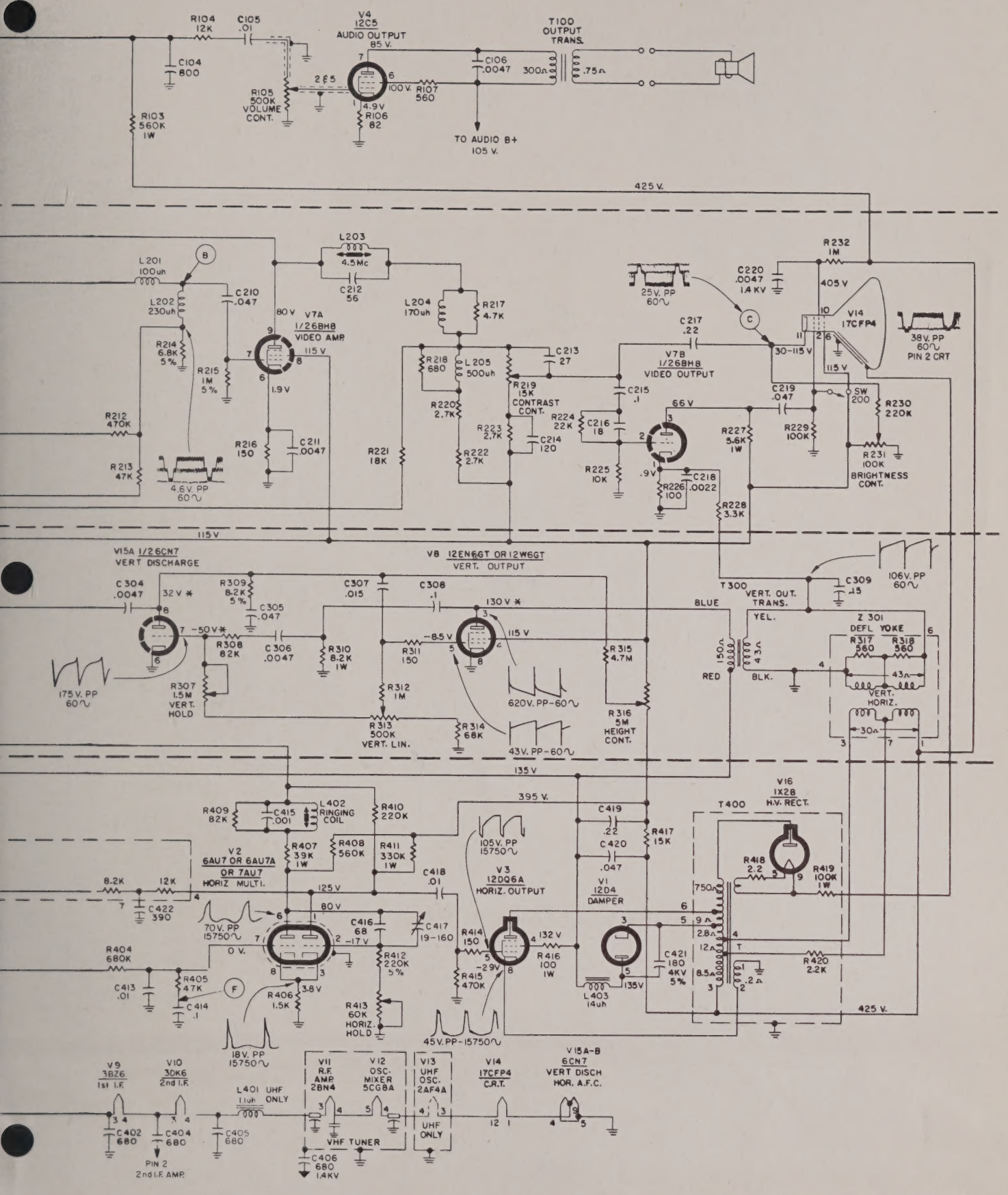
NOTES:

1. DC VOLTAGES MEASURED WITH VTVM FROM POINTS INDICATED TO B- ANT. TERMINALS SHORTED.
2. PEAK TO PEAK WAVE FORMS WERE TAKEN WITH CONTRAST CONT. SET FOR A 25 VOLT PEAK TO PEAK SIGNAL AT THE CRT CATHODE, ALL OTHER CONTROLS SET FOR NORMAL PICTURES.
3. ALL CAPACITANCE VALUES LESS THAN 1 ARE IN MFD AND VALUES GREATER THAN 1 ARE IN MMFD, WHILE ALL RESISTORS ARE 1/2W UNLESS OTHERWISE INDICATED.
4. * INDICATES VOLTAGES TAKEN WITH PICTURE ADJUSTED FOR NORMAL RASTER.

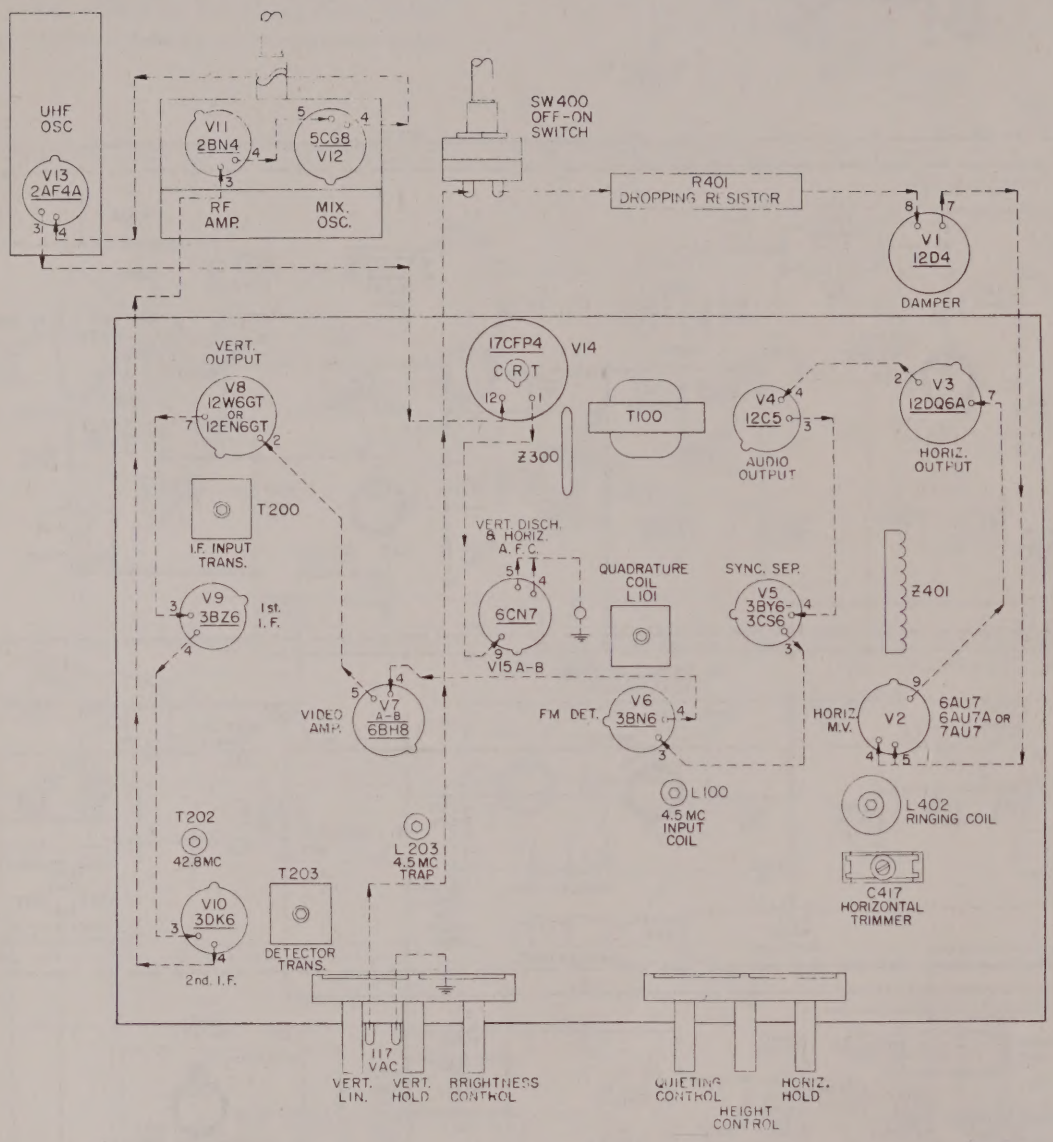


AIRLINE MODELS GTM-4201A, GTM-4301A

See next page for tube placement chart



Schematic Diagram Courtesy of Montgomery Ward & Co.



TUBE PLACEMENT CHART